CTAC MARKET EFFECT STUDY

VOLUME I: FINAL REPORT

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PREFACE

This study was developed in response to the California Public Utilities Commission's order (Decision 96-12-079) that the energy utilities conduct studies in 1997 designed to identify any market transformation effects of their traditional DSM programs. In collaboration with other members of the California DSM Measurement Advisory Committee (CADMAC), Southern California Edison (Edison) selected several of its DSM programs to evaluate, including the Customer Technology Application Center (CTAC). Drafts of this report were reviewed by members of the Market Effects Subcommittee (MES) of CADMAC, and Edison has incorporated most of those suggestions. In response to some issues raised, however, it may be helpful to provide a preface to the study, putting it into context.

The series of studies ordered by the CPUC was intended to be a retrospective look at "traditional" DSM programs that were not designed to produce market effects. It was a "last look back" at impact programs before turning our attention to the design, implementation, and evaluation of programs *intended* to produce market effects, toward an eventual transformation of segments of the energy efficiency market. There were at least two goals: to look for *any* evidence of market transformation from past programs, and to develop tools for the evaluation of market effects from the new era of market transformation programs.

In late 1996, the MES members and the utility Measurement and Evaluation staffs had limited experience in designing "market effect" studies, and our expectations were modest. Since this study of CTAC was one of the first work plans developed in the series of some 14 studies, there are limitations in the design that are evident now but were not then.

As an information dissemination agency, CTAC has many features to study, but the areas of interest were confined to those which were substantial enough and old enough to have *some* hope of having measurable market effects. Thus, we focused on CTAC staples: the lighting and HVAC seminars. The areas of interest also had to be DSM-funded, and this criterion excluded one of CTAC's most-likely candidates for exhibiting market effects: the Foodservice Technology Center. (CTAC has been very successful in spreading the word about the benefits of electric cooking, and a future study should be able to find ample evidence of its effects in the Southern California market for cooking equipment.)

Although the work plan was written in late 1996, there was a delay in the start-up of this project (from late 1996 until mid-1997) as a sampling frame was developed. The CTAC registration system of the attendees has been computerized since spring 1997, but before then, visitors were not routinely tracked, making the sampling frame one of the most troublesome components of the project design. After much investigation, we eventually determined that the session sign-in sheets were available, sufficient, and accurate, and they could provide a proper "population" from which to select attendees.

Finally, this study of the market effects of CTAC was conducted according to the revised work plan approved by the MES. It contributes its fair share to the collective knowledge accumulated in the 1997 market effects studies, and it will be used by CTAC staff to refine their continuing efforts to serve customers in Southern California.

CHAPTER 1
EXECUTIVE SUMMARY

This document presents the final report of Hagler Bailly's market effects study of Southern California Edison's (SCE) Customer Technology Application Center (CTAC). This center addresses a major area of interest for electric utilities as the deregulated industry evolves – effectively communicating technical information to customers to encourage the use of energy efficient technologies by offering a combination of demonstration projects, showcases, and seminars targeted at all customer sectors and trade allies. The purpose of this market effects study was to develop a customized application of current market transformation concepts and theories to assess the market effects of the CTAC energy efficiency information program.

The research design incorporated several research methodologies, including exploratory interviews with key SCE customers who have had frequent contact with CTAC, focus groups with CTAC commercial and industrial users, a telephone survey of 175 CTAC seminar participants, and a set of in-depth telephone interviews with 48 manufacturers, distributors, and vendors.

Market effects, as defined by Eto, *et al.*[1] refer to changes in the structure of a market or the behavior of market players that (a) reflect an increase in the adoption of energy efficiency products, services or practices, and (b) are causally related to a market intervention. This project was designed to determine if specific characteristics of CTAC's market interventions helped reduce specific market barriers and, as a result, helped increase long term demand for energy efficient measures.

- In designing this study Edison hypothesized that CTAC intervention strategies would result in 5 market effects:
  - Increased customer demand
  - Changes in vendors' stocking and promotional practices
  - Changes in manufacturers' production, shipping, pricing and promotional practices

[1] Joseph Eto, Ralph Prahl, and Jeff Schlegel, *A Scoping Study on Energy Efficiency Market Transformation by California Utility DSM Programs*, (LBNL-39058, July 1996).

- Increased product variety and availability, and decreased prices
- Increased market adoption

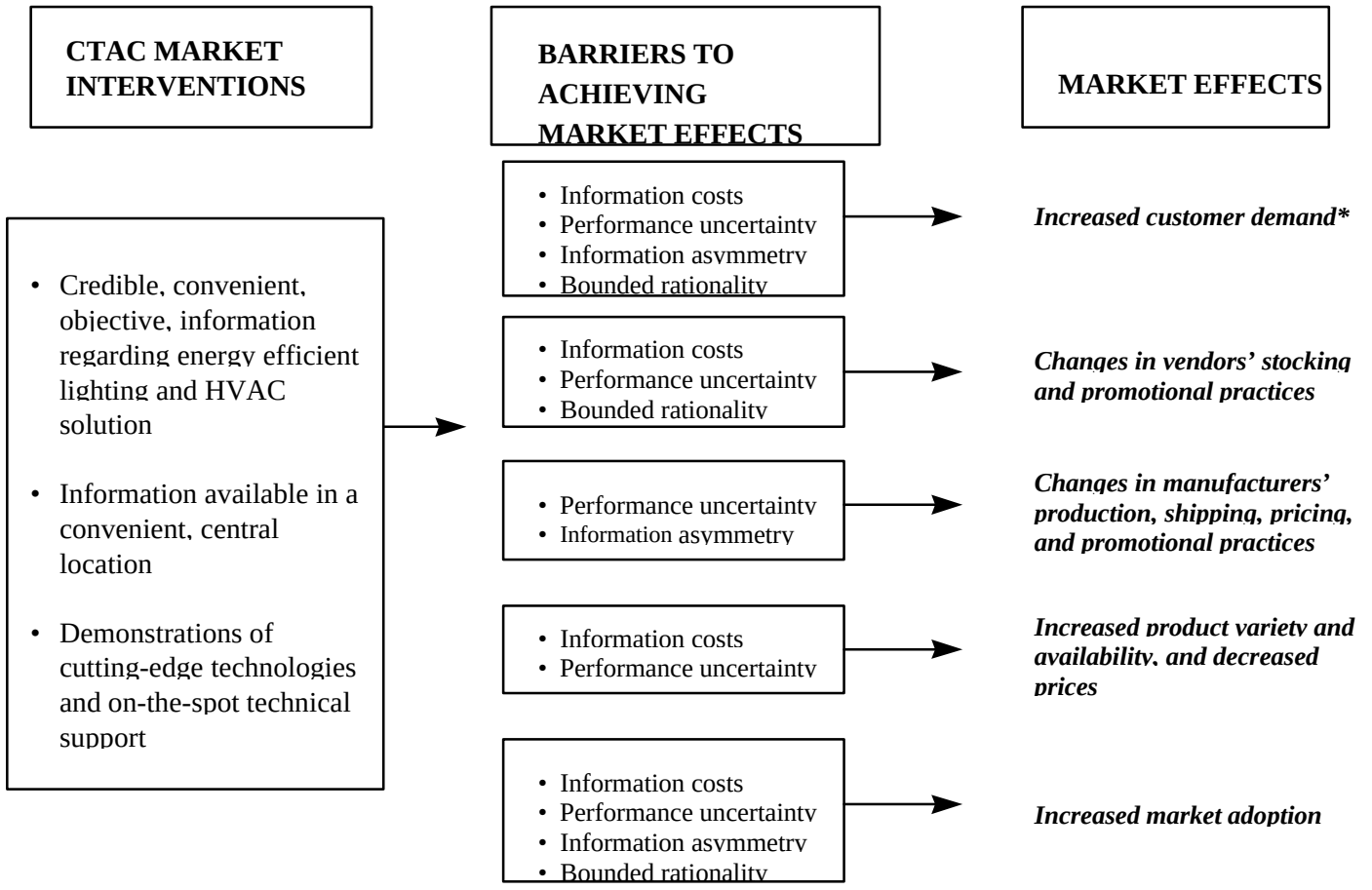
- Specifically, the research plan focused on the four hypothesized barriers to market adoption of energy efficient lighting and packaged HVAC equipment, including:
  - Information costs
  - Performance uncertainty
  - Information asymmetry
  - Bounded rationality

- Finally Edison identified several specific CTAC's market intervention strategies that could hypothetically be linked to a reduction in the barriers to these market effects, including
  - CTAC offers convenient, credible, objective, current information about energy efficient practices in a centralized location
  - CTAC offers demonstrations of cutting edge technologies and on-the-spot technical support
  - CTAC programs are designed to provide customized, competitive energy solutions, and individualized analysis

The data from this study are limited in that they rely on two inherently limited sources: participants in CTAC seminars, and trade allies that serve the Edison service territory. However, the data gathered and examined for this study suggest that CTAC market interventions are successful in reducing several barriers that have been identified by Eto, *et al.* as critical factors effecting the market for energy efficiency equipment. The data also support the conclusion that CTAC's market interventions can be causally linked to specific market effects via reductions in these barriers.

The following diagram illustrates how each of the CTAC market intervention strategies contributes to the reduction of the market barriers to increased customer use of energy efficient lighting and packaged HVAC equipment. As the following diagram suggest, the market interventions operate concurrently, and interact with one another to jointly effect the market. The data suggest that no single market intervention strategy is sufficient to cause significant market effects, but that when taken together, the several intervention strategies offered by CTAC do have a measurable market effect.

MARKET EFFECTS OF CTAC INTERVENTIONS



*Boldface type indicates the study found evidence of this market effect.

It is important to take into consideration the complexities of the energy use technology industry when examining the impacts of market intervention activities. CTAC appears to provide a set of market interventions that reduce certain barriers to increased market adoptions of energy efficiency measures. However, CTAC is but one factor – and, particularly in the case of the HVAC market, one small factor – that influences the market. The data clearly indicate that CTAC's influence is real and pervasive among those market actors it touches: however, CTAC penetrates only a small fraction of the potential market actors. Many powerful and omnipresent market forces act upon the market and while some are clearly mitigated by the CTAC intervention strategies, many are not. It is theoretically possible that as CTAC influence grows within the Southern California community, that it will achieve a "critical mass" and extend its influence more broadly, but until that time, it's influence is of limited reach.

CTAC has been a tactical success: whether CTAC or any one market intervention program can achieve strategic success has yet to be determined.

Recommendations Based on Additional Process Evaluation Research

The purpose of this research was to evaluate the market effects of CTAC's market interventions. However, a portion of the data gathered for this project might be better characterized as a process evaluation of CTAC. Based on that data, it seems fair to identify several market intervention strategies in which CTAC was particularly effective. This data collected for this effort, as well as corroborating data collected in an earlier evaluation research project conducted for CTAC, clearly demonstrate the CTAC seminars and product demonstrations successfully provide program participants with the cumulative effects of:

- Credible, objective, and state-of-the-art information regarding energy-use technologies that assist SCE customers in their efforts to adopt energy efficient measures;
- On-the-spot demonstrations of cutting-edge technologies in one convenient, central location that assist SCE customers in their ability to successfully select and purchase energy efficient equipment; and
- Information regarding competitive energy solutions that seminar participants are able to immediately implement in their business operations that will result in improved energy efficiencies.

The data suggest that as a result of numerous exogenous market factors, CTAC's market intervention strategies have resulted in greater market effects with regard to lighting than HVAC equipment.

This is not to suggest that there is no room for improvement. Based on the research findings, it appears that further reductions in market barriers that influence energy efficiency lighting and HVAC adoptions might occur if CTAC were to provide:

- Increasingly advanced and/or industry specific technical information on "special topics" so that participants can assess the long-term benefits of specific energy efficient measures within their own industry or within their own facility;

- Programs designed to provide information that is accessible on a day-to-day basis that provides individualized or customized information to SCE customers; this would assist CTAC participants to continue to utilize the knowledge and understandings about energy efficiency measures that they initially acquired through CTAC seminars;

- Programs targeted specifically at vendors and distributors, and designed to provide specialized demonstrations and technical support for new energy efficient products so that the sales benefits of energy efficient equipment are more readily understood; and

- Seminars designed to assist participants in understanding how to better "sell" energy efficiency measures both internally (that is, within their own business or organization) and externally (that is, with their own customers or clients) so that they are better prepared to promote energy efficiency measures that might otherwise be hindered by lack of information on the part of other decision-makers.

CHAPTER 2
OBJECTIVES AND METHODOLOGY

2.1 BACKGROUND AND INTRODUCTION

This document presents the final report of Hagler Bailly's market effects study of Southern California Edison's (SCE) Customer Technology Application Center (CTAC). This center is a significant and innovative undertaking by SCE. The services provided by CTAC address a major area of interest for electric utilities as the deregulated industry evolves – effectively communicating technical information to customers to encourage the use of energy efficient technologies. This center is one of a handful of such centers located around the country and is perhaps the most comprehensive, with a combination of demonstration projects, showcases, and seminars targeted at all customer sectors and trade allies.

This market effects study also represents an innovative undertaking by SCE. In 1997, California investor-owned utilities launched a series of studies of the market effects of their DSM programs, the results of which will contribute to the development of market transformation programs and of methods to evaluate the impacts of these programs. In addition, through this study SCE has attempted to integrate the paradigms and definitions presently used in industry on market effects indicators and measurement strategies. The approach of this project has been to develop a customized application of current market transformation concepts and theories to assess the market effects of the energy efficiency information services provided by CTAC.

2.2 REPORT ORGANIZATION

This document represents the final report of Hagler Bailly's market effects study of SCE's CTAC. Chapter 1 contains a concise Executive Summary, highlighting the principal objectives, conclusions and recommendations from the research tasks. This chapter, Chapter 2, reviews the objectives and methodology of the study and presents an overview of the data that form the core of evidence from which the conclusions and recommendations reported in Chapter 3 are drawn. Chapter 3 presents a synthesis of the research findings which are presented in detail in Chapters 4 and 5, along with Hagler Bailly's conclusions and recommendations. Chapter 4 presents the detailed findings from the customer research tasks, and Chapter 5 presents the detailed findings from the manufacturer, distributor and vendor survey research.

In support of the findings covered in this report, the following technical materials have been appended and can be found in Volume II of this report:

- Appendix A Qualitative Customer Research: Recruitment Script
- Appendix B Qualitative Customer Research: Discussion Guide
- Appendix C Quantitative Customer Research: User's Guide to the Data Set
- Appendix D Quantitative Customer Research: Telephone Survey Questionnaire
- Appendix E Quantitative Customer Research: Survey Frequencies
- Appendix F Quantitative Customer Research: Detailed Crosstabulation Tables
- Appendix G Manufacturer, Distributor, Vendor Research: Indepth Interview Guide
- Appendix H Manufacturer, Distributor, Vendor Research: Interview Capsules

2.3 OVERVIEW OF THE RESEARCH PROBLEM

Since SCE began operating CTAC in 1990, CTAC has offered up-to-date information on energy-use technologies that are energy efficient and environmentally sensitive to more than 140,000 visitors from throughout the nation and the world, and has provided solutions designed to help businesses run their operations more effectively. CTAC activities include technology demonstrations, educational seminars, and support for SCE's DSM programs. CTAC not only serves SCE's commercial, industrial, residential, and agricultural customers, but is also used as a training facility for employees.

This study was designed to assist SCE in assessing the market effects of the CTAC's market interventions. Market effects, as defined by Eto, *et al.*[1] refer to changes in the structure of a market or the behavior of market players that (a) reflect an increase in the adoption of energy efficiency products, services, or practices; and (b) are causally related to a market intervention. SCE has developed a set of hypotheses linking specific characteristics of its program to increased long term demand for energy efficiency measures. Using the structure elaborated by Eto, *et al.*, these hypothesized market effects are evidenced by a series of measurable market changes, including:

- Increased consumer demand for and market adoption of energy efficient commercial lighting and HVAC measures;

- Changes in production, shipping, stocking and promotional practices of lighting and HVAC vendors and manufacturers;

[1] Joseph Eto, Ralph Prahl, and Jeff Schlegel, *A Scoping Study on Energy Efficiency Market Transformation by California Utility DSM Programs*, (LBNL-39058, July 1996).

- Increased availability and diversity of energy efficient commercial lighting and HVAC measures; and
- Reduced costs and increased adoption of energy efficient commercial lighting and HVAC measures.

Eto *et al*. hypothesize that such market changes can be linked to the reduction of a set of barriers to adoption, such as:

- **Information costs**: the costs of identifying energy efficient products or services, or learning about energy efficient practices that arise from difficulties in accessing trustworthy technical information;
- **Performance uncertainty**: the difficulties of evaluating claims about future benefits for energy efficient investments and activities;
- **Information asymmetry**: difficulties customers face in evaluating the veracity, reliability, and applicability of claims made by sales personnel for a particular energy efficient product or service when sellers of energy efficient products or services have more and better information about their offerings than do consumers or have an incentives to provide misleading information; and
- **Bounded rationality**: the tendencies of individuals to make decisions based on rules of thumb, habits, or customs that may seem inconsistent with their goals .

CTAC market interventions are designed to reduce these barriers by offering customers cumulative exposure to measure-specific information. It has been hypothesized that certain characteristics of its operational, organizational, and customer support processes provide the customer support needed to reduce the barriers to adoption of energy efficient measures listed above. These program characteristics include:

- Providing credible information in a convenient, centralized location; offering a flexible schedule of workshops, seminars, and demonstrations; providing information regarding energy efficient technologies designed to reduce the difficulties of customers seeking to learn more about how to adopt energy efficient solutions to their lighting and HVAC operation;

- Providing objective information, on-site demonstrations and on-the-spot technical support designed to reduce performance uncertainty that may be associated with new energy efficient equipment;

- Providing current information about cutting-edge technologies that assist customers in learning about and designing energy solutions for their facility's lighting and HVAC operation in order to reduce the information asymmetry that can exist between customers and their contractors or equipment suppliers; and

- Providing current, objective information, on-the-spot technical support, and individualized information and analysis to customers as encouragement for customers to progress beyond bounded rationality.

Figure 2.1 highlights these underlying assumptions and graphically illustrates the hypothesized linkage between specific features of CTAC market interventions, market barrier reduction, and market changes. The methodology of this research project has been designed to assess the strength of the linkages between visits to CTAC, reduction of market barriers, and ultimately determine the market effects of the CTAC market interventions.

2.4 RESEARCH METHODOLOGY

Our approach to addressing the objectives of this study incorporated several research methodologies, including exploratory interviews with key SCE customers who have had frequent contact with CTAC, focus groups with CTAC commercial and industrial users, a telephone survey of 175 CTAC seminar participants, and a set of in-depth telephone interviews with 48 manufacturers, distributors, and vendors. Each of these research components are described in the sections that follow.

2.4.1 Customer Research

In consultation with CTAC and SCE program administrators, the research team decided to focus the customer research on SCE customers who had participated in seminars focused on lighting and/or packaged HVAC technology. CTAC administrators provided a complete list of attendees of seminars on lighting and/or packaged HVAC, and this list formed the sampling frame from which the customer interviews were selected. The participants represent customers across a wide range of commercial segments (See Section 4.1 CTAC Seminar Participant Profiles for a complete description of the participants in the survey).

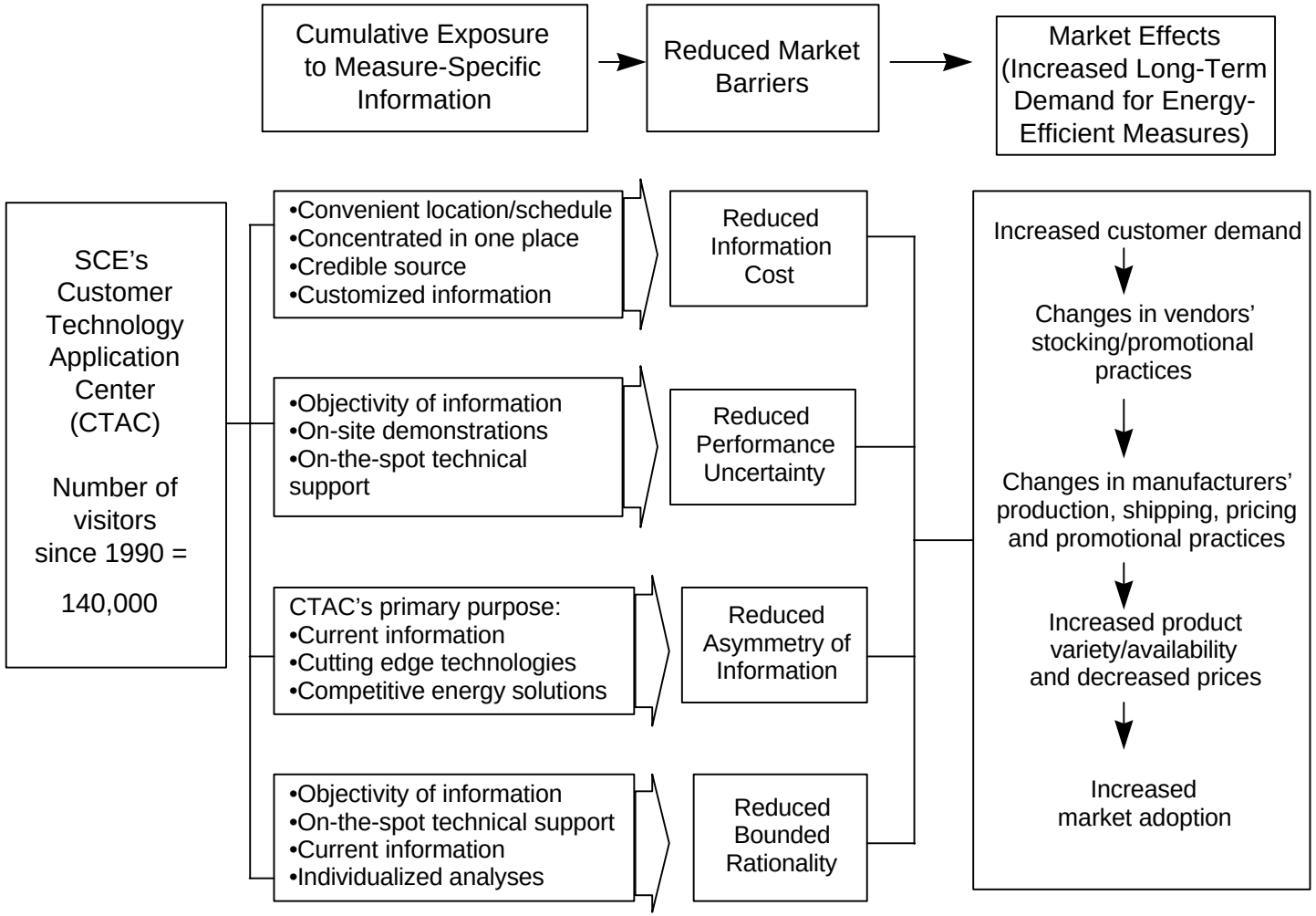
The customer research component of this study was implemented in two phases:

- An initial qualitative phase designed to gain insight into the customer decision-making process, corroborate that the barriers to purchasing and installing energy efficient equipment have been properly identified, and begin to assess the effect that CTAC seminars had on customers' efforts to implement energy efficient lighting and/or HVAC solutions; and

- A quantitative phase designed to measure CTAC's success in lowering the barriers to purchasing and installing energy efficient equipment, and measure the short- and long-term effects on SCE's customers' energy efficiency practices that can be attributed to CTAC market interventions.

The customer research was designed to assist SCE in measuring the short- and long-term market effects of the specific interventions provided by CTAC; the project was neither designed nor intended to serve as a complete program evaluation of CTAC. However, to some extent, a consequence of the research design is that the data yield a rich evaluation of the CTAC seminars and facility itself and, as appropriate, that data is reported in this study.

Figure 2-1 CTAC Market Intervention, Barriers, and Effects



- A trade ally survey designed to assess both lighting and HVAC industry insiders' experiences regarding manufacturing, distributing, selling, and installing energy efficient equipment. Areas of exploration with these key market actors included observed reductions in the hypothesized market barriers; actual changes in the production, distribution, promotion, pricing of energy efficient equipment; or increased customer demand for energy efficient lighting or HVAC solutions.

The following sections describe in detail the objectives and approach to each of the customer research tasks.

Qualitative Customer Research

Initial In-depth Personal Interviews

In order to maximize the value of the customer research tasks, an in-depth exploration of issues with key CTAC seminar attendees was completed. This exploration took the form of one-on-one, in-depth interviews with 20 key customers; each of these interviews was conducted on-site at the customers' facilities. These interviews yielded fruitful information to help articulate actual market barriers, recognize the most potent value of CTAC programs and seminars, and understand and better define potential market effects.

The research steps required for this effort included:

- *Field work initiation and set-up.* Recruitment lists were developed in cooperation with CTAC staff, and interview candidates were selected based on their extensive utilization of CTAC programs and seminars over the past three years (i.e., 1995-1997) and to reflect the range of customers served by CTAC. From a master list of CTAC seminar attendees, approximately 50 customers were identified, and from this select list, interviews were completed with 20 individuals.

- *Conducting the interviews.* Each interview covered a slightly different set of topics, guided by the particular set of CTAC programs and/or seminars in which the respondent has participated. At a minimum, however, each respondent was asked to discuss:

  - The value and objectivity of the information provided by CTAC through its programs and seminars; the extent to which CTAC has successfully provided customized and unbiased information that was useful to the respondent;

  - How (if at all) CTAC has assisted them in making decisions regarding energy efficiency measures;

- How (if at all) were their equipment decisions influenced by CTAC interventions; what were the most useful CTAC interventions; and their evaluation of the usefulness of CTAC on-site demonstrations and technical support; what additional programs and services they believed would assist them in making equipment decisions;

- Other programs that have assisted and/or influenced them in making energy efficient decisions for their organizations; what were the relative strengths and weaknesses of CTAC materials and their programs; and

- How CTAC assisted them in learning about energy efficient practices, evaluating claims about the benefits of energy efficient investments and activities. (Respondents were asked how they obtained information to assist them in negotiating purchases, and overcoming what may be well-ingrained but inaccurate or out-of-date habits, customs, opinions, or "rules of thumb" that limit their scope of considerations when evaluating potential energy efficiency measures.)

- *Analysis.* Although this small sample targeted key customer interviews and cannot be expected to yield statistically generalizable data, these interviews were extremely useful in understanding the influence process and the effects of programs (such as those offered by CTAC) on customers' knowledge, attitudes, and behavior. The interview results were analyzed to add insight regarding the ways that CTAC interventions influence market effects. The interviews provided unique and valuable insight in understanding key barriers to increased sales of energy efficient equipment in SCE's service territory, added to our awareness of the link between various program characteristics and specific market actors and barriers, and provided invaluable insight into additional ways in which CTAC can further reduce or eliminate barriers. Additionally, the results of the key customer interviews further improved the quality and direction of questioning implemented during the focus groups.

See Chapter 4 for detailed findings from these interviews and Appendices A and B for copies of the recruitment script and discussion guide.

Customer Focus Groups

Although the original proposal called for Hagler Bailly to complete one focus group with 12-14 attendees at an off-site location (non-Edison facility), in consultation with CTAC staff, it was determined that the study would benefit from increasing the number of discussion groups from one to two, and reducing the number of focus group participants in each group from 12-14 to 5-7.

As a result, one group discussion focused on issues associated with selecting and evaluating lighting equipment, and one focused on issues associated with selecting and evaluating HVAC equipment.

In addition, we agreed to hold the focus groups at SCE's Usability Center (a formal research facility located near CTAC facilities and equipped to record/videotape focus groups) and offer at least $100 per recruit as an incentive to encourage participation in the focus groups.

The focus group participants were recruited from a roster supplied by CTAC listing customers who had attended a CTAC lighting or HVAC seminar in the past three years (i.e., 1995-1997). Seminars on these two areas are some of the most popular and would draw participants from the widest range of customers. Other seminars (e.g., on indoor air quality, facility refrigerant, or hazardous material control) would attract a narrower clientele. HVAC and lighting seminar attendees would usually be facility managers (including owners of small businesses) or others responsible for the energy management of a facility (e.g., VP of Operations).

While each group focused on specific technology issues (i.e., lighting v. HVAC), the focus groups were designed to address the following discussion topics:

- Awareness of energy efficient products, participants' perceived need for "cutting edge" information, and description of the energy equipment decision-making process as it occurs in their organization;

- The types of information needed for a range of energy equipment and energy equipment related decisions; specific triggers that motivated energy equipment purchases, and difficulties they encounter in obtaining information or assistance in taking energy efficient measures; and

- Evaluation of the CTAC programs in terms of its convenience, credibility as an information source, and ability to provide customized information; how CTAC compares with other seminars, workshops or other types of information sources; what features of the CTAC program specifically assist them in learning what they need to know about energy efficient lighting and/or HVAC products.

Each focus group required approximately 1 ½ hours, was video and audio taped, and was moderated by Dr. Patricia Garber, an experienced market researcher in Hagler Bailly's San Francisco office. A summary of the focus group results (along with the results of the in-depth interviews) was prepared and submitted in November to the SCE Project Manager. The findings from the focus group are incorporated into Chapter 4 and Appendices A and B contain copies of the focus group recruitment screener and discussion guide.

Quantitative Customer Research

Telephone interviews were conducted in November 1997, with 175 SCE customers who had attended CTAC seminars. Each interview was conducted by telephone from Hagler Bailly's central survey facility in Madison, Wisconsin. Interviews each required approximately 20 minutes and were conducted by Hagler Bailly staff especially trained for this study.

The telephone survey sample frame was drawn from the same roster of CTAC seminar attendees used to recruit focus group participants. As such, both lighting and HVAC seminar attendees were included in the quantitative telephone survey sample frame. During the pretest, we monitored the extent to which non-Edison customers/end-users were introduced into the sample (i.e., non-Edison customers, architects and engineers, etc.) and determined that this was not a significant issue. However, vendors/contractors identified through the telephone survey screening process were removed from the sample and placed on the lists for the MDV surveys (see below). In addition, care was taken to monitor the proportion of respondents who had participated in lighting or HVAC courses, and to insure that the same proportion was included in the survey sample. As a result, 65% of the survey sample had taken at least one lighting course (the corresponding proportion in the CTAC roster was 68%) and 23% of the survey sample had taken at least one HVAC course (the corresponding proportion in the CTAC roster was 16%).

Hagler Bailly employed its standard interviewing procedures to complete the telephone surveys. These procedures incorporate a high number of quality control procedures. In addition to continuous monitoring of the actual interviews by a supervisor, a minimum of 6 attempts were made to complete interviews with sampled customers. In addition, Hagler Bailly interviewers are trained in a variety of refusal conversion techniques that are useful (when appropriate) in attempting to convert initial refusals into completed interviews. These procedures are designed to increase data quality by decreasing the chance of interviewer bias and non-response bias. Appendix C contains a User's Guide to the Data Set.

The survey was designed to assess if respondents:

- Have increased their interest in, awareness of, and knowledgeability about energy efficient lighting and HVAC equipment; if so, what components of the CTAC market interventions were most informative;
- Have been influenced by the CTAC market interventions to consider and/or purchase and install energy efficient lighting and HVAC equipment; if so, what components of the CTAC seminars were most important;
- Have experienced an increased ability to identify their equipment needs, and acquire and understand the necessary information to successfully negotiate equipment purchase; if so, what components of the CTAC market interventions were most helpful;

- Have experienced a decline in their concerns about how energy efficient equipment will perform as a result of the CTAC seminars; if so, what components of the CTAC market interventions were most useful; and

- Have utilized (and continue to utilize) knowledge they gained from participating in the CTAC seminars as part of their energy management decision-making; how do they "keep up" with new technologies; how (if at all) has CTAC assisted them in this regard. Respondents were specifically asked if they continue to refer to and/or use the knowledge they gained through CTAC's market intervention, or if their knowledge has faded over time.

As part of the interview, customers were asked to rate the CTAC seminars on a number of dimensions, and were asked to evaluate the usefulness of the specific CTAC course in assisting them in making energy equipment selections and purchases. Respondents were also asked to indicate how (if at all) their participation in CTAC seminars has specifically affected their understanding of energy efficiency issues, their ability to affect the energy policies at their organization, and their actual purchases of energy efficient lighting or HVAC equipment.

The results of the customer survey were analyzed in light of the findings from the qualitative phase to assess whether CTAC has been effective in reducing market barriers to energy efficient measures, and to assess the extent to which CTAC has actually had an effect upon the energy practices and equipment demands of its customers. The results of the customer survey are incorporated into Chapter 4 of this report. Appendix D contains a copy of the survey questionnaire, Appendix E shows the customer's responses to each of the questions asked on the survey, and Appendix F contains a set of detailed crosstabulations which formed the basis of the analysis reported in Chapter 4 of this report.

2.4.2 Trade Ally Research

As a complement to the customer research component of this study, a set of interviews with lighting and HVAC manufacturers, distributors and vendors was conducted. Prior to implementing the MDV research, several relevant trade ally research instruments and other industry data were reviewed to inform the design of our survey instrument.

Data were collected from manufacturers, vendors, and distributors via in-depth telephone interviews. A total of 48 interviews were completed with key players in both the C/I lighting and HVAC markets – eight manufacturers, twenty distributors, and twenty vendors. A small team of senior interviewers was enlisted to conduct the SCE trade ally research – a practice followed by Hagler Bailly for conducting executive or trade interviews.

The sample frame for these interviews was developed from several sources:

- The CTAC seminar rosters, which contained contact information for many HVAC and lighting businesses (e.g., architects, engineering firms, equipment wholesalers and retailers, installation contractors, etc.);

- HVAC and lighting businesses featured in the Electrical News, a Pacific Southwest monthly newsletter, and its associated website ("The Industry Online", *www.electricalnews.com*); and

- *Pro CD Select Deluxe 1997*, an electronic "yellow pages" CD ROM database searchable by SIC code and zip code.

Respondents were screened as part of the interview introduction in order to ensure that the appropriate respondent was recruited for the interview. These screening questions were designed to better understand the specific business area for each respondent. This was important both to screen out inappropriate respondents and also to insure that respondents would be able to answer questions in the survey insightfully. The sample was developed to attempt to represent a range of industry segments, business sizes, and energy efficiency practices. All respondents were screened to insure that they have a significant business practice in the Southern California area.

The trade ally survey was designed to gain insight from the perspective of manufacturers, distributors, and vendors of both lighting and HVAC equipment into the market trends related to energy efficient equipment. The survey was designed to measure the respondents' views regarding:

- Barriers to the adoption of energy efficient lighting or HVAC equipment. For example, respondents were asked if they have observed these barriers increasing, decreasing, or remaining steady over time.

- The importance of a set of industry-related factors that could influence customer adoptions of energy efficient lighting or HVAC equipment. Respondents were asked to rate the importance of such factors as:

    - Trade ally awareness of and interest in energy efficient equipment;
    - Trade ally acceptance of or confidence in energy efficient lighting equipment;
    - Trade ally efforts to sell and promote energy efficient equipment;
    - Perceptions of quality and performance of energy efficient equipment;
    - The relative price differences between standard and energy efficient equipment;
    - Delays in obtaining energy efficient equipment;
    - Business customer awareness of energy efficient equipment;
    - Business customer demand for energy efficient equipment;
    - Business customer acceptance of, or satisfaction with, energy efficient equipment;
    - Utility support and financial incentive programs for energy efficient equipment.

- The influence of a set of theoretical factors selected to assess the importance and effect of several market forces upon the market for energy efficient lighting and HVAC equipment. This list of factors was designed to gain insight into the market environment in which the CTAC program operates, and included:

  - Utility rebate or other financial incentive programs;
  - Changes in federal, state and/or local building codes and regulations;
  - Changes in availability of energy efficient lighting products;
  - Rising energy costs;
  - Environmental concerns of business customers;
  - Improvements made in quality and performance of energy efficient lighting products;
  - Reductions in the prices of energy efficient lighting products;
  - Your own efforts to market energy efficient lighting systems; and
  - Utility educational and informational programs.

- Issues and factors that trade allies believe influence selection of energy efficient equipment; these issues and factors reflect the components of the CTAC program that CTAC believes are most important in linking its intervention to specific market effects. These factors included:

  - The availability of impartial and objective information concerning technology choices;
  - The availability of credible/reliable information concerning the technology choices;
  - The availability of information that is convenient to obtain;
  - The availability of information at a low cost;
  - The availability of comparable technology choices with similar cost implications; and
  - Business customers' knowledge or sophistication with respect to comparing different technology choices.

A final set of questions was designed to learn more about trade ally awareness of, participation in, and perceptions regarding the level of influence derived from different information sources (including seminars and workshops). Although few of the trade allies included in the survey had actually attended any CTAC workshop or seminar, many had experience with "CTAC-like" programs. This set of questions was designed to measure:

- How trade allies believe that they (as well as their customers) best "learn" about energy efficient lighting and HVAC options; and

- The relative importance of each of the market interventions that CTAC offers in comparison with other information sources.

Before terminating the interview, respondents were given an opportunity to discuss their thoughts on what, if anything, could be done to expand the market for – or increase the market share of – energy efficient lighting and HVAC equipment, and to increase business customer demand for this equipment. These final open-ended questions were included to insure that any additional factors influencing customer decision-making, market barriers, or market effects not previously discussed would be uncovered.

Because of the in-depth nature of the interview, the results from each were summarized in capsule form and then synthesized to provide the "top-line" highlights. See Chapter 5 for this synthesis. Appendix G contains a copy of the interview guide and Appendix H contains a complete set of the 48 interview capsules.

CHAPTER 3
MARKET EFFECTS

3.1 CHAPTER OVERVIEW

This chapter presents a synthesis of the results from the research conducted with various actors in the markets for energy efficient commercial lighting and HVAC equipment – SCE customers who have had direct experience with CTAC's market interventions, and trade representatives who have the historical perspective to attest to potential changes (and anticipated changes) in market conditions over extended periods of time. Feedback from these market actors has been analyzed to provide insight into the key questions posed by this study, which are:

- **What changes have been observed in the commercial sector markets for energy efficient lighting and HVAC equipment?** Specifically, to what extent have we observed:
  - an increase in market demand for and adoption of energy efficient measures?
  - changes in vendors stocking and promotional practices?
  - changes in manufacturers' production, shipping, and promotional practices?
  - an increase in the availability and variety of energy efficient measures?
  - reductions in prices of energy efficiency measures?
- **Are these market changes the result of reductions in specific market barriers?** Have we seen:
  - reductions in the costs of identifying energy efficient products or services, or of learning about energy efficient practices (information search and processing costs)?
  - reductions in the difficulties consumers face when evaluating claims about future benefits made for many energy efficient investments and activities (performance uncertainty)?
  - reductions in "opportunism" on the part of energy efficient products and services "sellers" who have more experience, possess more specialized information, or

have incentives to provide misleading or misguided information (asymmetric information)?

- changes in the behavior of individuals during the decision making process so that their actions are more consistent with their articulated goals and less likely to be based on habits, customs, or rules of thumb? (bounded rationality)?

- **What were the direct or indirect causes for these reductions in market barriers?**
  - Were they the result of CTAC (or "CTAC-like") market interventions?
  - Or, were there a variety of non-program or exogenous market factors that can be used to explain the observed market changes?

- **Is there evidence to suggest that the observed market changes or market effects attributable (even if only in part) to SCE's CTAC market intervention will be long lasting or sustainable?**
  - Has the program intervention caused permanent changes in the process used by consumers to search for, select or consider energy-using equipment?
  - Will private market actors step in and continue to fulfill the function or service provided by the program intervention?

It is important to note that this study's research design was fairly pragmatic. We recognize that in the context of SCE's CTAC, no one-time, retrospective research study can answer all of the questions surrounding market effects and market transformation. We also recognize that the case for demonstrating permanent and lasting market effects must be built over time, using a measurement and tracking approach that CADMAC and other interested parties can accept as reasonable. In addition, our approach attempts to reduce the risk of failure (thus maximizing the likelihood of success) in measuring market effects by using multiple forms of evidence, all of which are designed to examine this issue from several different but convergent perspectives.

In developing the methodology for this study, we also recognize the difficulty in establishing linkages between CTAC market interventions and the behavior of various market players with respect to specific energy technologies. CTAC, for example, does not focus on recommending particular technologies as would be done in a site-specific energy survey. More importantly, we recognize that not all market changes observed in this and similar research projects will have been caused by any one utility program or market intervention. Therefore, our approach to measuring these changes and establishing factors of causality distinguishes between:

- market changes or market effects that can be linked directly or indirectly to CTAC market interventions;

- other market changes or market effects that can be linked to the provision of "CTAC-like" informational and educational services (but not necessarily provided by CTAC); and
- and still other market changes that cannot be linked to CTAC or CTAC-like services, but can be linked (either directly or indirectly) to other factors of causality.

3.2 EVIDENCE OF MARKET CHANGES

This section presents evidence relating to the presence or absence of change within the markets of interest to this study – that is, commercial sector markets for lighting and HVAC equipment. This evidence has been compiled from research examining the actual and intended energy efficiency measures taken by CTAC participants as well as research conducted and research exploring the views and experiences of key industry insiders and trade representatives (manufacturers, distributors and vendors). Data gathered from each of these sources has its limitations:

- Data gathered from CTAC participants may or may not represent a "true" picture of the actions of other potential market actors who could be "touched" by CTAC market interventions; CTAC participants represent only a small proportion of the potential market, and the participants in this study represent only a small proportion of the actual participants in CTAC seminars. This research project was neither designed nor intended to provide data on market share or equipment saturation. While we are confident that survey results can be generalized to participants in CTAC lighting and/or HVAC seminars, the extent to which such findings can be generalized to the total CTAC market or potential audience remains as a question that is unanswered by this research.
- Data gathered from industry informants may not represent a "true" picture of the actual market effects of CTAC interventions; the sample was designed to include a small sample of lighting and HVAC manufacturers, distributors, and vendors practicing in the Southern California region, but was not drawn as a statistically representative sample of the entire population. In addition, although numerous trade allies have in fact been exposed to CTAC market interventions, the trade ally sample was not drawn to represent those practitioners who have participated in CTAC seminars or demonstrations. While the sample did include a few respondents who have direct knowledge of or experience with CTAC, their perceptions of the potential market effects of CTAC are limited. While care must be taken when evaluating the data from such qualitative research, confidence in this data is improved by its external consistency with other studies of similar populations inquiring about similar market trends.

In this presentation of the evidence, we have attempted to integrate the customer research results and the trade ally findings to strengthen the weight of the evidence; however the limitations of the data must be kept in mind. The results from this customer research may over-state the effects of CTAC market interventions on the overall market for energy efficiency measures. It is also possible that the results from the trade research may under-state the effect of CTAC's market

interventions on the overall energy efficiency market. The reader is therefore cautioned of these potential biases in reporting results related to observed market changes based solely on the research findings included in this report.

3.2.1 Increases in Market Demand and Adoption

Has there been a measurable change in customer demand for energy efficient lighting and HVAC equipment? In response to this direct (as well as other indirect questions), very mixed opinions were expressed by the trade representatives interviewed as part of this study. Nearly all agreed that awareness has significantly increased and, for lighting products in particular, there have been some increases in end-user interest and knowledge.

However, not all agreed that there have been correspondingly significant increases in market *demand* and technology adoption rates across the board. Many felt strongly that increases in demand have been observed for energy efficient lighting equipment:

- Claims of increased sales were offered from a number of the trade representatives suggesting that there has been a substantial increase in customer demand for energy efficient lighting over the past five years.;
- Substantial demand increases were reportedly induced by utility program interventions – rebate and financial incentive programs in particular; and
- Lighting manufacturers report that energy efficiency has recently become (and will continue to be) a key component in the new product development arena – primarily as an essential ingredient for competitive marketing purposes.

While slightly lagging behind lighting manufacturers, some HVAC manufacturers also report that:

- Sales of energy efficient HVAC equipment have been positively influenced by utility programs; and
- In addition, there is some evidence that HVAC manufacturers have also begun to

  strategies for new product development.

There is some evidence that market changes in the HVAC industry have been observed but are of significantly limited magnitude (and with fairly short-term impacts) due to the failure of the market to significantly reduce or eliminate key market barriers. There is some, but less evidence that this is true in the lighting industry.

- For lighting equipment, these barriers include primarily factors related to lack of awareness and performance uncertainty; and

- For HVAC equipment, trade representatives cite significant barriers of lack of awareness and interest, lack of adequate and accessible technical/sales support during the decision-making process, product unavailability, and performance uncertainty.

There was wider agreement, however, that both markets will face significant change with respect to customer demand in the future (i.e., next five years). For example, those who reported increased sales of energy efficient equipment are using these business trends to plan for anticipated increases in sales in the near future. Also, manufacturers claim they will continue to incorporate energy efficiency into the new product development cycle in an effort to remain and increase their competitiveness and strategic marketing edge.

Increased demand for energy efficient HVAC equipment will likely result from increases in awareness and knowledge but only if met with commensurate increases in product availability, correspondingly increased technical/sales support, and substantial reductions in performance uncertainty.

The customer research data suggests that participants in CTAC seminars may have a more positive attitude, a higher awareness, and a stronger demand and technology adoption than the "typical customer" encountered by lighting or HVAC distributors and vendors. This is not surprising given the customer research sample included only CTAC seminar attendees while the trade allies were selected from a broader sample. What, then, can be reasonably concluded from this data?

- The qualitative research supports the conclusion that, as a result of their increased awareness, interest and knowledge, CTAC customers may have an increased demand for energy efficient lighting and HVAC systems.

- Quantitatively, the evidence suggests that many CTAC customers have selected energy efficient lighting and HVAC equipment as a direct result of their involvement in CTAC seminars.
  - Out of 163 CTAC seminar participants, 85 (or 52%) have purchased or upgraded lighting equipment since attending a CTAC seminar(s). Of these customers, approximately 67% reported that they selected energy efficient lighting alternatives as a result of, among other things, the information presented to them by CTAC.
  - Similarly, about 69 (or 42%) of 164 CTAC seminar participants have purchased or upgraded their HVAC equipment since participating in CTAC-sponsored events. Of these customers, approximately 62% reported that they selected energy efficiency HVAC equipment based on their experiences at CTAC.
- In addition, many customers have made changes to the operation of the energy equipment at their facility that they can link to their experiences with CTAC. Out of 169 CTAC seminar participants surveyed, 68 (or 40%) stated that as a direct result of CTAC's market intervention, they have changed how their businesses use energy. Further, among those who have changed their operation, over two-thirds (or 47 former CTAC seminar participants) have changed the operation of their lighting system, and about one third (or 22 former CTAC seminar participants) have changed the operation of their HVAC system.

Because of the potential bias in the selecting CTAC seminar participants as the focus of the customer research, *these data are not intended to represent actual "market share" or energy efficient technology or practice "adoption rates."* Instead, the data are presented here to suggest that, when faced with decisions to select new energy-use products, most CTAC participants (self described as "more informed and educated" customers) give serious consideration to energy efficiency issues and, if possible, attempt to install energy efficient equipment.

3.2.2 Changes in Vendor Stocking and Promotional Practices

Changes in distributor and vendor promotional practices also appear to be highly correlated with increases in awareness, interest, and knowledge among a broad range of market actors. Most trade representatives agreed that, currently, awareness remains "spotty" and is likely to be highest among distributors and vendors – as well as end-users – who are also interested in technology choices and actively seek out the knowledge required to improve their understanding and ability to promote energy efficient alternatives. Obviously, distributors and vendors who lack awareness of the benefits of energy efficient technologies are not likely to feature them in their promotion and sales activities. Others note that they are gaining knowledge, but it is taking some time due to the industry's inundation with information in recent years.

In addition to awareness and knowledge barriers, however, there are other significant distribution system bottlenecks and pricing practices that are holding back significant change in distributor and vendor stocking and promotional practices. For example:

- Most distributors and vendors openly regard energy efficient solutions as a "hard sell" and, not surprisingly, do not proactively encourage increased sales of energy efficient equipment. This can be the case for both lighting and HVAC equipment, but is less likely to occur in the lighting market than in the HVAC market due to the relatively more complex nature of the HVAC purchase process and equipment involved.

- Also, many distributors and vendors are in "the bidding market." For obvious reasons, they do not regard this as a market in which they have a significant amount of financial flexibility nor substantial opportunity to communicate the benefits of operating cost efficiencies over low-bid preferences.

- Many distributors regard themselves as "order takers" – they send out what is ordered. In other cases, if energy efficient solutions are not specified by the end-user (or the architect), then the less efficient, lower cost solution will be proposed. On the other hand, some distributors choose to do business as "value-added information providers," and proactively seek to educate their customer about the long-term benefits of energy-efficient solutions. Although this research uncovered these two approaches to product marketing and sales (and suggests that there are gradations between these two poles), the data are not sufficiently detailed to explain why distributors chose one or another approach.

Given these considerations and absent any significant incentive (i.e., increased customer demand, financial/sales incentives, etc.) to act differently, the promotional tactics employed by many distributors and vendors are not likely to change. Incentives alone may not be adequate to effect change in the HVAC markets without corresponding increases in product availability, as well as significant reductions in information costs and performance uncertainty.

Some lighting equipment distributors and vendors are more optimistic with respect to their promotional and sales approaches. For example, several agreed that if one "sits down with the end-user and lays out the numbers" the customer will typically choose the energy efficient alternative over standard efficiency. While some simply do not regard it as "their place" in the market to educate end-users, others believe it is their responsibility – since they are often closest to the end-user in the distribution chain. Is this finding an example of differing marketing and sales strategies employed by businessmen and women, or is it an example of bounded rationality limiting the perceptions and sales tactics of these business people?

There is also evidence to suggest that manufacturers have been successful in "pushing" energy efficient technologies down the distribution chain, primarily in response to competitive pressures in both technology markets. Nevertheless, most manufacturers agreed there are still substantial obstacles to significant change in distributor and vendor promotional and sales practices. For

example, some have developed and proactively offered sales training seminars to their major distributors and vendors. These programs, according to the manufacturers, have been limited in their success due primarily to the barriers acknowledged above by the distributors and vendors themselves.

3.2.3 Changes in Manufacturer Production, Shipping, and Promotional Practices

There is a certain amount of frustration among lighting manufacturers: despite their intentions to make a quality product that will deliver on its promises to offer cost-effective, energy efficient lighting products, they feel that limited support from distributors and vendors have restrained their success in increasing market adoption. Some manufacturers speculate that perhaps the market is not reacting as expected because it is perceived to be inundated with new products and new product information and distributors and end users simply lack the information and know-how to make an informed decision. Most lighting manufacturers, however, appear to be more than just hopeful that their persistence and patience will pay off – as evidenced by the importance they have begun to place on energy efficiency as a means of responding to competitive pressures.

HVAC manufacturers also see changes in the production and promotion of energy efficient equipment, albeit somewhat lagging behind lighting manufacturers, based on competitive pressures. Most have allocated considerable budget towards sales and promotion of energy efficient equipment, and expect the importance of sales and marketing to increase as the market for energy efficient HVAC equipment grows.

Some distributors and vendors agree that both lighting and HVAC equipment manufacturers are now "jumping on the band wagon" of energy efficiency in response to competitive pressures. However, those who have been in the industry for some time are quick to clarify that the manufacturers who appear to have been relatively proactive in the early years were in fact fairly slow to react – and may have been "forced" earlier to take a proactive stance only because of more stringent regulations and utility programs. Moreover, some distributors, vendors and end-users also argue that barriers that relate to performance uncertainty remain prevalent in the market today as a result of manufacturers' inability to sufficiently validate their claims of energy efficiency.

Nevertheless, distributors and vendors agree that the manufacturer "push" to introduce new, competitive products has been particularly successful in raising awareness at various points along the distribution channel. In addition, manufacturers have been fairly proactive in offering seminars and similar programs for educating lighting and HVAC equipment end-users, installers and specifiers. By providing practical education through demonstrations, as well as showcase "Lighting Centers," manufacturers hope to have a substantial impact on equipment selection decisions in the future, adding greater market "pull" to the equation.

3.2.4 Increases in the Availability and Variety of Energy Efficiency Measures

Since there are significantly different issues facing the current market for energy efficient lighting v. HVAC equipment with respect to product availability and diversity, we first present findings related to lighting equipment followed by a discussion of the findings concerning HVAC equipment.

Lighting manufacturers report that the diversity and quality of energy efficient lighting products has improved significantly in recent years, and, as a result, end-user satisfaction with energy efficient lighting equipment is high and increasing. Lighting distributors and vendors also feel that improvements – and anticipated improvements – in energy efficient lighting products have led to increased acceptance of and confidence in this equipment. In addition, recent product innovations – such as features that reduce or eliminate waste disposal costs – have added extended benefits to the product that are likely to contribute to increased satisfaction. However, most agreed that it is too early to speculate whether these new, improved products will have immediate or significant effects on customer demand and adoption. Participants in CTAC seminars also report that as a result of the CTAC market intervention, they are more interested in, aware of, and able to negotiate for energy efficient lighting measures.

One might argue that issues related to significant delays in obtaining new products can be associated with the barrier of product unavailability. In the case of energy efficient lighting products, however, manufacturers claim that delays are virtually non-existent in today's market, with the exception of the occasional delays for "brand new" products. Lighting distributors and vendors also report that they have not experienced delays in obtaining energy efficient equipment, and do not believe that product delays have been a market barrier for some time. Again, due to competitive pressures, manufacturers have improved and expanded their energy efficient equipment production capabilities to remain in business. Such business practices provide evidence that would argue for the lastingness of the market transformation of the energy efficient lighting equipment market.

Market demand and adoption of energy efficient HVAC equipment, on the other hand, is constrained by the barrier of product unavailability – according to manufacturers, distributors and vendors. Specific brand names were mentioned as not yet producing commercial-sized units in the higher efficiency bins (e.g., 12, 13 or 14 SEER). [One distributor reported, however, that some of the manufacturers have announced that, within the next six to nine months of 1998, they will begin producing higher SEER units (i.e., 12 or higher).]

A few distributors reported that the manufacturers whose products they represent have only recently come on the market with new, energy efficient commercial-sized equipment. Before that, most of the major manufacturers did not produce comparable equipment models with differing efficiency levels. As a result, distributors and vendors had concerns about product

performance and were hesitant to "push" a more expensive product if they were not absolutely certain they could substantiate claims of higher efficiency and real payback.

As a result of these reported barriers in product availability, distributors and vendors speculate that it will take considerable time for market awareness to grow through the distribution network.

Manufacturers describe the following factors as inhibiting product development:

- There have been constraints in developing new energy efficient HVAC equipment that have to do with federal environmental regulations requirements.
- Regulatory indecisiveness was also cited as a contributory factor in delaying the new product development cycle for energy efficient HVAC equipment.
- Reacting to pressures to keep product prices as low as possible, some manufacturers claim that it is becoming more difficult to offset cost-cutting by methods to get more efficiency.

Despite the apparent lack of energy efficient equipment availability reported above, some manufacturers and some distributors claim that there are no significant delays in delivering high efficiency HVAC equipment (that is currently manufactured). However, at least one distributor reported that, due to lack of availability, they do not sell any high efficiency units unless the contractor can wait for up to a year for delivery.

3.2.5 Reductions in Prices of Energy Efficiency Measures

According to most lighting trade professionals, prices of energy efficient lighting equipment have come down in the past few years, but not all would agree that prices have come down enough to eliminate this barrier and significantly influence demand and adoption throughout the market.

Lighting manufacturers speculate that as sales and promotional activities for energy efficient equipment increase, and a wider variety of energy efficient products are introduced on the market, the relative price difference between standard and energy efficient lighting equipment will decrease. Further reducing the price differential will be of great benefit to distributors and vendors who feel they currently expend considerable effort "selling" energy efficiency based on payback criteria. Similarly, distributors and vendors regard reductions in the prices of energy efficiency measures as one of the most influential factors affecting the end-users' purchase decisions because it helps them get the customer past the "bottom line" first-cost concern.

Generally similar concerns related to price face the HVAC equipment markets with one notable exception: very few of the market actors contend that prices have "come down" for energy efficient equipment *at all*. In fact, many regard the price one would have to pay for energy efficient HVAC equipment as substantially higher than less efficient alternatives and, as such, this represents one of the most significant barriers facing the current market.

3.3 REDUCTIONS IN MARKET BARRIERS AND EVIDENCE OF CAUSALITY

Are the observed changes in the market for energy efficient lighting and HVAC equipment the result of reductions in specific barriers facing these markets? According to Eto *et al*.: "Long term increase in demand of energy efficiency measures [is due to reduced market barriers, which are] due to the cumulative exposure to measure-specific information."[1] Therefore, a decrease in market barriers should lead to an increase in the demand for energy-efficient measures in the long term.

As a result, this project has taken on the challenge of attempting to ascertain the direct or indirect causes for these reductions in market barriers. The research was designed to look for evidence that these barrier reductions (and resulting market effects) were either the direct or indirect result of SCE's CTAC market intervention activities. As part of our investigation, we also examined whether or not reductions in market barriers and corresponding market effects could be linked to "CTAC-like" market interventions. Finally, our examination also uncovered a number of non-program or exogenous market factors that appear to better explain some of the observed market changes.

As appropriate, the data also provides evidence to suggest that certain of the observed market changes or market effects attributable (even if only in part) to utility program intervention may be long lasting or sustainable. Again, the reader is cautioned to recognize that the case for demonstrating permanent and lasting market effects must be built over time, using a measurement and tracking approach that CADMAC and other interested parties can accept as reasonable. The data presented here reflect what has been gleaned from the current research and may suggest a need for follow-up study over time.

Finally, where warranted, we have also provided recommendations for building on the success of CTAC market intervention activities and potentially expanding its success to reach a larger audience and bring about more significant and longer-lasting change in the lighting and HVAC markets overall.

To reiterate, CTAC hypothesized that there are linkages between specific characteristics of CTAC market intervention activities and reductions in market barriers, and that reductions in these market barriers would lead to increased adoptions of energy-efficient equipment. These linkages are outlined once again for the reader below:

- Providing credible information in a convenient, centralized location that offers a flexible schedule of workshops, seminars, and demonstrations regarding energy-efficient technologies will reduce the **information costs** of customers seeking to learn

[1] Joseph Eto, Ralph Prahl, and Jeff Schlegel, *A Scoping Study on Energy-Efficiency Market Transformation by California Utility DSM Programs* (LBNL-39058, July 1996), Figure 3-5, page 56.

more about energy-efficient solutions to their lighting and HVAC operation.

- Providing objective information, on-site demonstrations and on-the-spot technical support will reduce **performance uncertainty** that may be associated with new energy-efficient equipment.

- Providing current information about cutting-edge technologies that assist customers in learning about and designing energy solutions for their facility's lighting and HVAC operation may reduce **information asymmetry** that can exist between customers and their contractors or equipment suppliers.

- Providing current, objective information, on-the-spot technical support, and individualized information and analysis to customers may offer encouragement to customers to progress beyond **bounded rationality.**

A discussion of each of the hypothesized market barriers follows, along with a summary of the evidence to support whether or not CTAC market intervention activities have led to significant reductions in these barriers and whether or not these observed changes can be considered permanent or sustainable.

3.3.1 Information Costs

Information costs – the costs of identifying energy efficient products or services, or learning about energy efficient practices.

It has been hypothesized that access to convenient, concentrated, credible and customized information can lead to reductions in information costs. Both the customer and trade ally research suggests that this hypothesis is true. The customer research shows direct evidence that CTAC market interventions have been particularly successful in contributing to reductions in this important market barrier. Moreover, the reductions in information costs have led to increased adoption of energy efficient equipment and energy management practices. There is also some evidence that these market effects may be sustainable.

For example, CTAC is regarded as a very convenient, highly credible information source. It has the information one might need in one, centrally located place, and it offers relevant course material frequently and on an reasonable schedule. It also offers credibility – a highly valued dimension for any information source. In addition, it provides objectivity – something customers can get from other sources but often do not have the time nor the skills to access.

It is interesting to note that in a prior evaluation of CTAC these same results and conclusions were reached. Although this prior study was designed for a different purpose, such a striking similarity in results argues for the validity of this finding.

CTAC information has also been strongly linked to anticipated changes in energy efficient equipment selection decision processes and changes in energy management practices. For example, as a result of their experience with CTAC, customers are more likely to consider energy efficiency specifications when choice is available (82%), are more aware of new technologies and practices (72%), and are better equipped to "sell" projects internally to management (60%).

As stated above, a significant percentage of CTAC seminar participants reported that as a result of information they obtained from CTAC they considered and ultimately decided to install energy efficient equipment. Just over half (55%) have installed energy efficient lighting equipment, and 37% selected energy efficient HVAC systems. In addition, the majority (70%) have made changes to the operation of their lighting equipment and systems with the intention of more efficiently managing their energy use, and about one third (32%) have similarly made changes to the operation of their HVAC equipment and systems.

There is also evidence that CTAC information has resulted in some longer-term, sustainable market effects. For example, many customers report they still continue to use and refer to information obtained from CTAC market intervention activities (64%), most find that it has not "faded from memory," (85%), and some say their experience with CTAC has (or may) result in their company changing its policies regarding energy efficiency investments and/or decision making processes (43%).

Designing an effective strategy for sustaining information obtained via CTAC market interventions (or at least increasing the likelihood of sustainability) needs to incorporate elements that would provide enhanced services for customers in need of more customized information and individual "on-the-spot" analyses and solutions. According to some of CTAC's users, CTAC has performed relatively well in terms of providing them with customized information and individual solutions, but there is room for improvement. Customers have reported that attending CTAC courses provides the basic fundamentals for many customers who need it. It has also helped many customers get "up to speed" in rapidly changing technological industries.

However, some customers want access to more advanced technical information on "special

seems to be an untapped market for CTAC to provide information to its customers on an individualized basis that is somewhat technically advanced, specific to their industry, and easily and readily accessible (even for a fee).

A key point here, however, is that these services would need to be available on an "as needed" basis, as well as on an on-going educational and informational basis. CTAC's central mission is to provide the on-going educational and informational services; providing the staffing and maintaining the administrative structure required to offer an enhanced "as needed" or "technician on-call" service steps somewhat outside of CTAC's current mission. The implications of adding

this enhanced level of service should be considered through more careful study of the likely magnitude of the anticipated benefits as well as the costs.

Although not specifically discussing CTAC and its ability to reduce the barrier of information costs, the trade allies interviewed as part of this study confirmed that lack of information and understanding among end-users presents a significant barrier facing the market for energy efficient lighting and HVAC equipment. Lack of awareness in general and lack of awareness of the benefits of the energy efficient technologies in particular combine to produce relatively weak market demand. While trade allies have observed increases in customer awareness, interest and demand over time (and most believe that this will continue to increase over time), it may not be sustainable (or continue to grow) without significant additional market intervention (market pull) on the part of many within the distribution channel (e.g., manufacturers, distributors, vendors), as well as well as other intermediaries and market players (e.g., utilities, financial institutions, government agencies).

3.3.2 Performance Uncertainty

Performance Uncertainty – the difficulties consumers face in evaluating claims about future benefits, which are made for many energy efficient investments and activities.

Providing objective information, technical support and demonstrations can lead to reductions in the market barrier of performance uncertainty. The research suggests that CTAC market interventions have been particularly successful in this regard. Since performance uncertainty is closely related to information costs – that is, the costs associated with acquiring the information needed to evaluate performance claims – many of the findings noted above apply when discussing CTAC's success in reducing the barrier of performance uncertainty.

Acquiring information, however, may not alone be effective in reducing this barrier. In describing the "ideal seminar", customers identified many features that are consistent with those offered by CTAC, such as solutions-oriented seminars which make use of hands-on demonstrations and/or case studies, and opportunities to receive objective or unbiased information and/or share experiences with other customers and colleagues. CTAC seminars have been described as helping customers "go beyond the code book" to instruct participants to "think on their own." The technical support and demonstrations form the core of most seminars and, as one customer put it, "the demonstrations are worth their weight in gold."

Trade allies also confirmed that customers have performance uncertainties that tend to reduce their interest in and demand for energy efficient technologies. On a technical level, this is a much more significant factor for HVAC equipment than for lighting. That is, customers (as well as many trade allies) find it difficult to verify or even loosely corroborate performance claims due to

the relatively complex and variable set of conditions that must be considered in making such claims. As a result, in the case of HVAC applications, without access to such specific interventions such as "hands-on" demonstrations, customized service, and individualized analyses and solutions, it may be very difficult (if not impossible) to reduce performance uncertainties associated with high efficiency HVAC measures.

Performance uncertainty for lighting equipment can also be a significant issue for some customers, especially with respect to issues such as aesthetics and operating "conditions" (e.g., light levels, noise, flickering, etc.). These issues are of particular relevance to many retail establishments, service companies, offices, and other businesses where multi-task lighting is required, including both performance claims as well as ability to demonstrate a payback. For these customers, CTAC seminars and demonstration equipment have proven relatively effective in influencing customers' perceptions and reducing uncertainty surrounding equipment performance in these areas.

Both trade allies and customers suggested similar ways to enhance CTAC's ability to further reduce performance uncertainty barriers. For example, they suggested that customers and trade allies who have experienced "success stories" based on CTAC market interventions should be enlisted to showcase their successes in a creative manner. Also, provision of increased networking opportunities among the CTAC staff, instructors, seminar participants, and trade allies would go a long way in increasing the value of CTAC events as well as aiding in "spreading the word" and reducing performance uncertainties.

Consideration could also be given to pursuing training efforts sponsored and delivered cooperatively by utilities, trade representatives, and even some influential customers. These training sessions could be taken "on the road" and delivered to large customer facilities, property management companies, engineering firms, etc. In addition, educational seminars delivered in-house to the major equipment distributors and vendors might eliminate the high cost associate with sending large sales departments to traditional seminars, while at the same time offer an opportunity to get a much more tailored message across to a larger audience.

There is some evidence to suggest that changes in the performance uncertainty barrier for lighting technologies have been fairly substantial – that is, the performance of some products has been evaluated over time, appropriate modifications have been implemented, and for many early lines of equipment the "results are in." However, this is less true for HVAC equipment. There is considerable discussion today over the performance claims for energy efficient HVAC equipment, such as the current debate about whether or not energy savings claims from units with higher SEER ratings will actually be realized in certain climates.

Moreover, the observed changes in performance uncertainty over time can hardly be regarded as long-term, since these markets are constantly evolving based on changes in (and improvements to) key technological performance criteria. Therefore, there remains a significant need for continuation of informational and educational services – such as CTAC seminars – that will provide the current, unbiased technical support and demonstrations required to evaluate evolving

(and new) claims about existing (and newly developed) energy efficient equipment solutions and energy management practices.

3.3.3 Asymmetric Information

Asymmetric Information – more and better information possessed by sellers who have an incentive to provide misleading information.

CTAC's central mission is focused on reducing the market effects associated with this critical market barrier. The research results suggest that CTAC has been particularly successful in this area. One of the primary reasons customers attend CTAC events is to gain more knowledge in fields that may be new to them or at least continuously changing to the extent that they need to be kept "up to speed". Both the qualitative and the quantitative customer research revealed that dealing with contractors and equipment suppliers can be vexing to the novice.

In many ways, CTAC seminars have provided customers with relevant knowledge and confidence that CTAC seminar participants claim has improved their ability to negotiate with even some of the most persistent contractors and equipment suppliers. This is evidenced through customers' responses to direct questions regarding their reasons for participating in the CTAC seminars as well as the benefits they have received as a result of participating.

In addition, there is at least some anecdotal evidence that suggests some customers have been particular successful in virtually eliminating the asymmetric information barrier (at least for them individually). For instance, some customers reported that they proposed and eventually selected energy efficient solutions that their vendors were not particularly "proactive" in promoting. Others indicated that their "business" has spurred their equipment suppliers to change their stocking and promotional practices such that other customers may be indirectly benefiting.

The results of the research conducted with "sellers" of energy efficient equipment suggests that while asymmetric information may be a barrier, the trade research does not provide any evidence of observable change. It is important to keep in mind that during the interviews with trade representatives, none actually "offered" direct feedback on this issue. Instead, one can infer based on their responses to indirect questions that "sellers" may in fact contribute to the continuation of this important barrier.

The most significant indicator of their contribution to this barrier stems from trade representatives' statements that "Customers are perpetually looking to preserve their bottom line." Equipment suppliers admit that what sells most easily in these situations is "the cheapest, least complicated solution" If one can infer from these discussions that the "easy sell" is the clear objective from the perspective of the seller, then information on the cheapest and most likely least efficient solution will be provided. But what about the customer's bottom-line?

Some trade representatives do have the customers' longer-term, bottom-line interests in mind and (for reasons that include improving their own company's short-term bottom-line) will make credible attempts to sell energy efficient solutions. However, many simply do not spend enough time with their customers, do not fully understand the benefits of energy efficient solutions themselves, and/or have not been properly trained in the proper sales techniques. As a result, the easy sell – the cheapest and least efficient solution – is the sale that is attempted and achieved.

The key to further reductions in the barrier of asymmetric information is increased awareness, interest, demand and *confidence* on the part of the buyer. CTAC seminars have been relatively successful in achieving more confident and informed buyers. Consideration might be given to holding specialized seminars (or sessions within existing introductory seminars) that highlight the importance of recognizing buyer preference in a competitive market, as well as more practical and constructive "tips" for negotiating with persistent or otherwise unresponsive sales departments.

It is unclear whether or not enhanced sales staff training and motivational sessions – absent significant incentives – would greatly contribute to reducing this barrier. What could be effective is increased emphasis in trade ally training on the benefits to the "bottom-line" of the supplier resulting from increased sales of efficient equipment (with presumably higher prices, higher margins).

3.3.4 Bounded Rationality

> **Bounded Rationality – behavior by an individual during the decision making process that may seem inconsistent with an individual's goals, including rules of thumb, habits, and customs that can limit the focus or scope of consideration for the decision.**

Providing information to customers through CTAC seminars, no matter how individualized it may be, may not be adequate to discourage some customers from relying on "rules of thumb", habits or customs. As pointed out by Eto, *et al*., rules of thumb will be used, to varying degrees, by most individuals when considering almost any decision. Offering customers access to a broader base of current and objective information – such as that offered by CTAC – does not necessarily guarantee that individuals will process and act upon this information accordingly. However, one might speculate that, over time, this information could lead to new or better rules of thumb, habits and customs.

As discussed above, however, information obtained via CTAC seminars does reduce the barriers of information costs, performance uncertainty and asymmetric information. At a minimum, access to and use of this information will tend to open the scope or focus of consideration for investment decisions. Our research shows that customers have benefited from the information obtained via CTAC seminars when they themselves are considering energy efficiency investments, when they

present their considerations to internal decision makers, and when they are negotiating with external suppliers. It is possible, that is considering the scope of their decisions, customers may have in fact incorporated new "rules of thumb" (e.g., higher efficiency lighting = longer life = lower wattage = lower maintenance and operating costs) and new habits (e.g., different/new operating methods to improve efficiency).

There is some evidence CTAC information has resulted in some longer-term, sustainable market effects. For example, many customers report they still continue to use and refer to information obtained from CTAC market intervention activities (64%), most find that it has not "faded from memory," (85%), and some say their experience with CTAC has (or may) result in their company changing its policies regarding energy efficiency investments and/or decision making processes (43%). It is likely that the rules of thumb previously utilized by these customers have been modified.

Trade allies interviewed as part of this study confirmed that lack of information and understanding among end-users presents a significant barrier facing the market for energy efficient lighting and HVAC equipment. One interpretation of this finding is that trade allies are reflecting on the bounded rationality of their customers: lack of awareness in general and lack of awareness of the benefits of the energy efficient technologies in particular combine to lead buyers to rely on imprecise (or downright inaccurate) rules of thumb. While trade allies have observed increases in customer awareness, interest and demand over time (and most believe that this will continue to increase over time), it may not be sustainable (or continue to grow) without educating customers so that they have less reliance on outdated or inaccurate rules of thumb.

Seen from the buyers' side, CTAC seminars have been described as helping customers "go beyond the code book" to instruct participants to "think on their own." The technical support and demonstrations form the core of most seminars, and appear to assist customers in questioning their habits, rules of thumb, or customs that limit the scope of consideration for their equipment buying decisions.

Performance uncertainty and bounded rationality appear to be closely related. Trade allies generally believe that their customers' performance uncertainties tend to reduce their interest in and demand for energy efficient technologies—particularly in the case of packaged HVAC equipment. When customers (as well as many trade allies) find it difficult to verify or even loosely corroborate performance claims due to the relatively complex and variable set of conditions that must be considered in making such claims, rules of thumb, habit and customs come into play. Particularly in the case of HVAC applications, without access to such specific interventions such as "hands-on" demonstrations, customized service, and individualized analyses and solutions, it may be very difficult (if not impossible) to reduce bounded rationality.

As has been pointed out elsewhere in this report, trade allies may or may not see it as "their place" to "educate" their customers. Rather, some trade allies (particularly vendors) are likely to see themselves as "order takers." Rather than question this custom or rather than change their

habitual patterns of interaction with their customers, some trade allies limit the scope of the decision by relying on what may be inappropriate rules of thumb. Sharing "success stories," or sales data demonstrating that marketing higher efficiency equipment can indeed result in profitable business for distributors and vendors may assist in breaking down some of the bounded rationality that may be operating in these circumstances.

For example, the "rule of thumb" that most customers operate with is that their contractor, distributor, or vendor "knows best" and will provide them with the best equipment for their situation. Some CTAC customers report that they have questioned this assumption, and report that they proposed and eventually selected energy efficient solutions that their vendors were not particularly "proactive" in promoting. A few customers even reported that their "business" has spurred their equipment suppliers to change their stocking and promotional practices, resulting in a slight shift in the "customs" of the distributors.

The key to further reductions in the barrier of bounded rationality is increased awareness, interest, demand and *confidence* on the part of the buyer. CTAC seminars have been relatively successful in achieving more confident and informed buyers. Consideration might be given to holding specialized seminars (or sessions within existing introductory seminars) that highlight the importance of recognizing buyer preference in a competitive market, as well as more practical and constructive "tips" for negotiating with persistent or otherwise unresponsive sales departments.

Many of the recommendations that have been suggested to reduce others barriers should improve the likelihood that customers avoid making decisions based on rules of thumb, habit or custom when they have easy, reliable and timely access to information that could better inform their decision making processes. Or, when rules of thumb cannot be avoided, customers have expanded the "bounds" or scope of their consideration somewhat so that decisions made based on these rules of thumb are inherently better informed although in a boundedly rational fashion.

CHAPTER 4
DETAILED CUSTOMER RESEARCH FINDINGS

This chapter presents detailed findings from the results of the customer research completed as part of this market effects study. As described in Chapter 2, both qualitative and quantitative customer research was conducted. The qualitative research consisted of 20 in-depth interviews and two focus groups with SCE customers who had attended CTAC seminars and workshops over the past three years. The quantitative research involved a telephone survey with 175 SCE customers who had also attended CTAC seminars and workshops in 1996 and 1997. Copies of the various materials used to recruit and interview customers as part of this research are included in Volume II: Appendices.

The results from this research are presented in the sections that follow and are organized around six main discussion areas:

- Summary of CTAC seminar participant "profile" (i.e., respondent job titles, employment history, major roles and responsibilities, etc.);
- Description of the information sources used by CTAC seminar participants to assist them in making decisions regarding energy-using equipment and energy management practices;
- Identification of the factors that motivated customers to attend CTAC-sponsored seminars and workshop;
- Description of the benefits and value customers derive from attending CTAC seminars;
- Influence of the information obtained via CTAC seminars of customers' actual and anticipated decisions regarding energy-using equipment and energy management practices; and
- Listing of customers' suggestions to improve the benefit, value and influence of CTAC services.

In each of these discussion areas, we first present the results from the qualitative research followed-by the quantitative survey results – noting significant differences as appropriate.

Throughout each section, summary data tables are also presented based on the quantitative survey results. In analyzing the quantitative data, we also looked for any significant trends that were evidenced across different customer groups or characteristics. The data was analyzed according to

motivation for attending CTAC seminars, and frequency of attending CTAC seminars. Generally, we noted only slight differences across these customer groups and have reported in the text only those that are potentially of interest in indicating trends in the data. (The reader is encouraged to refer to Appendix F for the detailed presentation of the cross-tabular survey results.)

4.1 CTAC SEMINAR PARTICIPANT "PROFILES"

This section presents a summary of descriptive characteristics for CTAC seminar participants. It is intended to introduce the reader to the general types of customers who attend CTAC seminars, their roles and responsibilities within their business organizations, and their level of technical sophistication.

Keep in mind that, by design, customers included in both our qualitative and quantitative customer research samples had attended at least one CTAC lighting or HVAC seminar, and the customers interviewed as part of the qualitative research phase had participated in several CTAC seminars, including at least one focusing on either lighting or packaged HVAC equipment. Results from the quantitative survey suggest that our sample is representative of the population of such CTAC seminar attendees –approximately two-thirds of the sample attended lighting seminars, another 23% attended HVAC seminars, and the remaining 10% attended combinations of lighting, HVAC, energy management, and other seminars.

4.1.1 Qualitative Findings

Typically customers included in the qualitative research phase hold technical positions within their organizations and are responsible for multiple building management and maintenance tasks. Some are relatively new to their current jobs, but most have longer-term (presumably related) experience working for their current company. These findings imply that CTAC seminars have generally attracted mostly a technical audience but one that is varied in terms of its level of technical sophistication.

The following briefly describes the full range of characteristics exhibited by customers included within the qualitative sample:

- *Business Type*: The majority of respondents managed older commercial office or retail space, while others were involved with management of warehouse space, hotels, multi-family dwellings, and industrial space.

- *Job Title*: Most respondents were employed in the area of facility or plant management in some capacity (i.e., chief engineers), while some participants worked on the supply end as contractors, designers, or distributors.

- *Job Tenure*: Respondents ranged from those who had only recently acquired facility management or maintenance job responsibilities to those who had been in facility management for decades. While some participants' job responsibilities included supervision of others for whom CTAC courses are appropriate, the typical respondent worked in a "department of one."

- *Job Responsibilities*: The typical respondent described his or her job as having a variety of responsibilities, with management or maintenance of the lighting or other energy equipment representing only a portion of the responsibilities. Only in the very largest facilities did respondents tend to be solely responsible for energy equipment management or maintenance.

- *Expertise*: Respondents also ranged in terms of their level of technical expertise, from those for whom electricity and energy concepts were unfamiliar at the time they attended the CTAC course, to highly experienced professional electrical and mechanical engineers.

4.1.2 Quantitative Findings

The quantitative customer survey results are consistent with the qualitative findings in that the majority of the CTAC seminar attendees are individuals of varying levels of technical sophistication who are responsible for facility management processes. However, as shown in Table 4.1, the quantitative sample also includes a fair number (16%) of executive decision-makers. This finding offers evidence that CTAC's appeal extends somewhat up as well as down the executive decision-making hierarchy.

Table 4.1: Job Titles of CTAC Seminar Participants

	Representation in Sample	
	(N)	**%**
Facility managers, maintenance managers, plant managers	67	38%
Chief engineers, plant engineers, engineers, energy managers	33	19%
Executives (owners, presidents, vice presidents)	28	16%
HVAC technicians, electrical technicians	21	12%
Other (architects, customer service representatives, administrative assistants, sales representatives)	26	15%
Total	**175**	**100%**

As shown in Table 4.2, the sample included CTAC seminar participants from a wide array of business and commercial activities, including manufacturing and industrial facilities, commercial office buildings and governmental facilities, schools and colleges or universities, retail sales establishments, health services facilities, and apartment buildings and other multi-family dwellings.

Table 4.2: Commercial/Industrial Segments Represented by CTAC Seminar Participants

	Representation in Sample (N)	%
Manufacturing and industrial facilities	33	19
Commercial office buildings and governmental facilities	33	19
Schools and colleges or universities	18	10
Retail sales establishments	16	9
Health services facilities	12	7
Apartment buildings or other multi-family dwelling	10	6
Other	53	30
Total	**175**	**100%**

CTAC seminar participants have about 4 years experience in their current position, and about twice that as an employee of their company, as shown in Table 4.3.

Table 4.3: Job Experience of CTAC Seminar Participants

	Length of employment		Length of time in current position	
	(N)	%	(N)	%
Less than 3 years	23	13	58	33
3-5 years	42	24	54	31
More than 5 years	110	63	63	36
Total	**175**	**100%**	**175**	**100%**
Average	**8-9 years**		**4 years**	

All of the participants have multiple job responsibilities and the majority of participants have responsibility for multiple facilities, as shown in Table 4.4.

Table 4.4: Job responsibilities of CTAC Seminar Participants

	Building Management		Building Maintenance		Building Management and Maintenance	
	(N)	%	(N)	%	(N)	%
1 Building	26	25	24	21	21	22
2 -5 Buildings	15	14	14	12	25	28
5 or more Buildings	65	61	75	67	45	49
Total	**106**	**100**	**113**	**100**	**91**	**100**

Respondents were also asked to describe their roles in the decision to purchase energy equipment. As Table 4.5 illustrates, a large majority of the respondents in the quantitative customer survey indicated that they were responsible specifically for identifying new equipment needs as well as evaluating the technical or economic potential of new purchases. In addition, most were also responsible for selecting a vendor for equipment supply and installation.

About two-thirds of the respondents in the quantitative customer survey were involved in decisions regarding lighting equipment, and just over half were involved in decisions regarding HVAC equipment. In addition, a very small number had equipment responsibility for additional electrical, manufacturing, plumbing, or refrigeration equipment. However, while most of the respondents were considered to be decision-influencers, fewer than half have final purchase authority.

Table 4.5: Decision Making Responsibilities of CTAC Seminar Participants

	Representation in Sample	
	(N)	%
Responsible for identifying new equipment needs	144	83*
Responsible for evaluating the technical/economic potential of new purchases	139	80
Responsible for selecting a vendor for equipment installation	122	70
Involved in decisions regarding lighting equipment	118	68
Involved in decisions regarding HVAC equipment.	103	59
Final purchase authority	77	44
Total number of respondents to which question was asked	174	--

***** These percents do not add up to 100%, as each question was asked separately of each respondent.

4.2 INFORMATION SOURCES USED BY CTAC SEMINAR PARTICIPANTS

This section presents a summary of the specific sources of information of on which CTAC seminar participants often utilize to keep abreast of the most current energy-related issues. Numerous sources were mentioned, as the following discussion shows.

4.2.1 Qualitative Findings

As initial sources of information, respondents rely on a variety of formal and informal networks of colleagues, counterparts, and competitors. Most people have developed relationships with associates both inside and outside of their organizations. Typically, they initially turn to this network when they have questions or when they require help making a decision.

Other valuable resources include manufacturers' representatives, distributors, vendors, print materials (i.e., trade journals, equipment specifications), and workshops or courses (of which CTAC was almost always described as the preferred example).

A large concern for participants was that information received through trade journals and sales brochures (and even through distributors, to a lesser extent) is not at the appropriate level of detail. Respondents often find that such information is either too general, too detailed, or too technical for their needs. Additionally, the information available from the manufacturers (either through the manufacturer's representatives or through the distributors) is often too difficult to "apply" into specific situations respondents face. For example, they may have unique space, temperature, or use requirements about which specific information is difficult to obtain. In this context, respondents report that in CTAC workshops and seminars, they have opportunities to ask specific questions and get personalized answers.

Almost every respondent complained not that they lacked information, but that they were inundated with information that was time-consuming or difficult for them to sort through, indicating a need for other information resource outlets that could be customized, or tailored to their specific needs.

CTAC seminars are perceived as one way to "cut through" an otherwise overwhelming amount of information and to obtain "usable" information that is delivered at an appropriate level of technical detail that meets the participants' individual needs.

In addition, CTAC seminars were considered to be particularly useful to people who are new to facility management. The qualitative research discovered that dealing with vendors can be vexing to the novice. In particular, respondents who were new to their job at the time of the interview all described how they gained confidence in working with vendors and in their ability to make the most energy-efficient decisions even in the face of some persistent salespeople through CTAC seminar attendance. For example, one focus group participant stated that he requires his vendors

to stock differently as a result of information obtained through a CTAC seminar, and his comments elicited the following:

- *"That's what's great about CTAC because you can come here and learn about new products from experts and see how it will benefit your location. It gives you the knowledge to know what to do rather than relying on our one vendor."*

- *"We have this one vendor who brought in a new more efficient [lighting system] only because we asked for it. And we knew we should ask for it as a result of the CTAC course."*

With regard to seminars and workshops, respondents often indicated that many are too "sales oriented," and are devised as simply ways for vendors to push their products. These participants also indicated that they felt this practice undermines the overall credibility of seminars or workshops in general when it comes to selecting actual vendors. Even some of the CTAC instructors were perceived as engaging in this practice, although most of the respondents explained that the CTAC workshops are more objective in this regard than are other workshops. When examined more closely, the respondents generally stated that the purpose of CTAC was not to recommend contractors or vendors, but to provide broader information about a wide range of topics or practices.

4.2.2 Quantitative Findings

Similarly, the quantitative survey explored the types of information sources used by CTAC seminar participants. In order to better understand how different information sources are used to meet different information needs, respondents were asked to list the most useful sources of information they use to learn more about new technologies, energy use, energy practices, energy efficiency, as well as identifying vendors and contractors. Table 4.6 summarizes the responses to this set of questions and the following text highlights important distinctions among customer groups.

Table 4.6: Sources of Information of Importance to CTAC Seminar Participants

	New Technologies		Energy Use at your Facility		Energy Efficiency		Vendors and Contractors	
	(N)	%	(N)	%	(N)	%	(N)	%
Trade journals	84	52*	38	26	57	37	25	17
Manufacturers' reps or distributors	15	9	15	10	19	12	10	7
Seminars or workshops	28	17	27	18	31	20	3	2
Colleagues or consultants	23	14	24	16	20	13	37	25
Utility company	8	5	36	24	25	16	5	3
Number of respondents answering each question	**162**	**--**	**148**	**--**	**155**	**--**	**149**	**--**

***** These percents do not add up to 100%, as respondents were allowed multiple responses.

Information Sources for New Technologies

As Table 4.6 illustrates, trade journals and other industry sources (such as industry newsletters) are the most important sources of information regarding new technologies for customers. Trade journals are mentioned by over half of the respondents as the preferred source in meeting this information need.

Seminars and workshops, were slightly less likely to be used by respondents to learn more about new technologies. However, those respondents who do rely on seminars and workshops to help keep abreast of new technologies, noted that the ability to interact with instructors and other participants as well as having the capability of participating in hands-on demonstrations were important in their learning process.

Information Sources Regarding Facility Energy Use

Respondents reported a much wider variety of information sources when in need of facility energy use. Trade journals, industry newsletters and information provided by utilities are used by about half of the respondents to meet this information need. As with new technology information needs, a fair number of respondents attend seminars and workshops or rely on colleagues or outside consultants to keep informed on the latest issues in energy.

Among those participants who do rely on seminars and workshops to obtain information about energy use, the ability to interact with the instructors and/or the other participants, as well as the depth of the material that can be covered are especially valuable features of such courses. Hands-on demonstrations are of some value, but are not as important as the ability to personally interact with the other participants in the workshop.

Information Sources Regarding Energy Efficiency

The majority of respondents cite trade journals, seminars and the utility company as their preferred sources of information regarding energy efficiency. Less frequently mentioned as useful sources of information are colleagues, and manufacturers' reps or distributors.

Not surprisingly, seminars are regarded as somewhat more valuable by customers who have attended two or more CTAC seminars. Respondents who prefer to obtain information on energy efficiency through seminars describe the benefits of a seminar as providing "readily available" information, as covering the material in an in-depth fashion, providing a "hands-on" environment, and offering the opportunity to interact with the instructors and with other participants.

Information Sources Regarding Vendors and Contractors

When seeking information about vendors and contractors, respondents most commonly turn to their colleagues. This type of "word of mouth" is mentioned as the preferred source of information about vendors and contractors by almost one-third of the respondents.

Seminars and workshops are not considered to be valuable sources of information about contractors or vendors (mentioned by only 2% of the respondents).

4.3 CUSTOMER MOTIVATIONS FOR CTAC SEMINAR ATTENDANCE

The following section presents the specific factors that motivated customers to participate in CTAC seminars and workshops.

4.3.1 Qualitative Findings

As part of the qualitative sample design, all respondents had attended at least one seminar or workshop through CTAC, and most had taken several. It was discovered as well that nearly all respondents indicated that they plan on attending at least one additional CTAC seminar. Respondents described several reasons or motivations they had for participating in CTAC seminars, such as:

- reviewing or learning "the basics" of electrical or HVAC systems;
- assisting them to acquire knowledge in a new field (that is, new for them);
- broadening their knowledge in their current field, updating information, keeping current with new products and trends; and
- improving their abilities to negotiate with contractors, manufacturers, and internal clients;
- meeting other people with similar job responsibilities, and hearing about their solutions to common (or even critical) problems.

Most respondents report that by attending CTAC workshops and seminars, they acquired information that they could indeed use on their jobs as part of their energy equipment decision making. Moreover, many stated that as a result of their participation in CTAC workshops, they have greater understanding of energy efficiency, and as a result, are able to make "smarter" recommendations. For example, several respondents reported that as a direct result of CTAC workshops, they were able to make recommendations that allowed them to "make do" with the HVAC equipment while making energy efficient adjustments (or "fixes") that allowed them to achieve their energy use goals and avoid a major purchase of new equipment. Illustrative comments include:

- *"They brought me up-to-date in terms of more efficient equipment."*
- *"We have a lot of court lights and after a CTAC course I recommended that we changed to lights that had a motion sensor and it saved us a lot. This was done as a direct result of the CTAC course."*

4.3.2 Quantitative Findings

As part of the quantitative customer survey, respondents were asked to list the reasons why they participated in CTAC seminars. Although respondents were encouraged to list multiple reasons, the data clearly indicate that CTAC is utilized as an information source, as discussed earlier. As Table 4.7 illustrates, respondents attend workshops for a variety of reasons, but obtaining information is the primary reason for participating in CTAC seminars.

Table 4.7: Motivation to Participate in CTAC Seminars

	Representation in Sample	
	(N)	%
I wanted more information	40	23%
CTAC is a credible information source	31	18%
I needed the knowledge from the CTAC seminars to help me meet my career goals	31	18%
My company was thinking about purchasing some equipment and I wanted to learn more about a general topic (i.e., lighting, HVAC, or environmental regulations)	26	15%
My company was thinking about purchasing some equipment and I went to CTAC to learn more about a specific technology	26	15%
I was curious about what CTAC had to offer	24	14%
Wanted to help my company meet energy standards	19	11%
Someone in my company asked me to attend	19	11%
CTAC provides objective information that I can't get anywhere else	16	9%
I wanted to consult with someone at CTAC regarding a specific application or problem for my company	10	6%
I wanted to test a new product	9	5%
CTAC has a good reputation for its seminars	9	5%
CTAC seminars are convenient	9	5%

***** These percents do not add up to 100%, as respondents were allowed multiple responses; approximately half of the respondents gave multiple responses.

The quantitative data, like the qualitative data, suggest that the primary motivation for participating in CTAC seminars is to obtain information about energy equipment. Further, CTAC is considered a credible source of information, and is highly valued for that reason. Participants attended CTAC seminars to gain information on general as well as specific technologies, and to obtain information needed to make planned equipment decisions.

Some respondents also noted that they needed information specifically for furthering their career objectives. This may indicate that the CTAC seminars are viewed as more "customized" in that people are attending for specific reasons (rather than general energy issues), and are having their needs met.

4.4 BENEFITS AND VALUES RECEIVED AS A RESULT OF CTAC SEMINARS

This section presents customers' perceived benefits and values as a result of participating in CTAC workshops and seminars.

4.4.1 Qualitative Findings

All respondents emphatically stated that they had found great value in the CTAC workshops and courses; all respondents felt that their time was well spent and that they gained information that they continue to use on their jobs. This is not to suggest that respondents did not have suggestions for CTAC — particularly suggestions for additional course extensions; ideas about how the workshops could be improved; or specific criticisms of the facility, instructors, or materials. It is important to note, however, that the overwhelming response to CTAC seminars was positive, and that suggestions were offered with the hope that they would be seen as "constructive."

Nearly all respondents describe CTAC seminars as "focusing on the basics." While some are comfortable taking and repeating basic courses ("*I always pick up something...*"), others believe that they already have sufficient basic knowledge and believe that CTAC should offer additional

they regularly continue to rely on the materials and knowledge they obtained through CTAC to make on-the-job decisions, but find that over time they "forget" what they have learned and therefore repeat courses. As one respondent put it, "*codes are changing all the time anyway, and even though I've been at this for over 10 years, I like to take the basic review courses just to keep up*."

Most respondents had little difficulty identifying what they thought would be an "ideal" course. According to them, the ideal course is solutions-oriented (requiring participants to work through a "case" or engage in realistic problem-solving activities), uses demonstrations (rather than "talking heads"), offers unbiased information (rather then simply presenting a "sales pitch"), gives participants numerous opportunities to share their practical experiences and expertise, and limits "theory" to that which is absolutely necessary for the participant to engage in the demonstration or activity. CTAC compares well with the "ideal" course, however, CTAC seminars would be improved if they included even more "activities" and more fully "engaged" the workshop participants.

CTAC seminars and workshops are designed to offer practical, current information to its customers in a convenient, accessible, and inviting format. The goal is to lessen (or eliminate) barriers that might otherwise hinder customers in the installation and use of energy efficient equipment. As part of the interviews and focus groups, respondents were asked to describe how, if at all, CTAC seminars and workshops helped them more readily request, specify, design, or install energy efficient equipment.

As CTAC hypothesized, such factors as convenience, capability to provide credible and up-to-date information, as well as ability to provide an environment where participants can actively participate in product demonstrations were the most frequently mentioned components of CTAC seminars.

- **Convenience**. CTAC serves the greater Los Angeles and Orange County regions, and as such, is in a reasonably centralized location. Respondents report that seminars are repeated often, held at reasonably convenient times, and for a reasonable amount of time (depending on the seminar). Most respondents explained that as Southern California residents, they were "used to" driving long distances, and generally figured that anything "under an hour" was a reasonable distance.
  - A few respondents stated that CTAC seminars and workshops should be held on the respondents' "own time" rather than during time that could be spent on the job, but other respondents, when queried about this possibility thought that CTAC workshops were most appropriately conducted during the workday.
  - Although almost all respondents agreed that CTAC workshops are "convenient," few thought that convenience, *per se*, is an important feature of CTAC. Some suggested that CTAC offer "mobile" seminars, but stated that although this would make it "more convenient," they didn't find the distance a significant hindrance.
- **Technical Support and Demonstrations.** Most respondents believe that they have helped their organization save money (often very considerable amounts of money) as a result of the technical support they received at CTAC. Most respondents stated that the demonstrations at CTAC helped them find new, more cost-effective solutions to their energy use. Respondents report that the CTAC seminars are "solutions oriented" and are designed, as one respondent put it, "*to go beyond the cookbook, to teach you how to think on your own.*" When asked to clarify what it is about CTAC that is most useful to them, respondents almost always referred to the technical support and demonstrations that form the core of most CTAC workshops. As one respondent stated, "*the demonstrations are worth their weight in gold*."
- **Credibility.** Almost every respondent described CTAC as highly credible. Most explained that information from CTAC bears a "stamp of approval" (more than one respondent compared it to the Good Housekeeping Seal of Approval) and information "brought home" from CTAC is considered to be virtually indisputable. In many cases, respondents pointed out specifically that purchase requests for energy efficient equipment based on CTAC recommendations are highly valued within their organizations. CTAC's high level of credibility results from the objectivity with which CTAC presents technical information. As one respondent stated, "*everyone knows you get straight answers from CTAC.*"

- **Cutting Edge Information**. Some respondents described CTAC workshops as "cutting edge" while others described the information they received as "basic information they need to keep up to date." Most respondents complained about the "flood of information" they had to process in order to know what is new or hot in their fields, and valued CTAC for assisting them in cutting through this information. Typically, respondents believe that when it comes to making equipment recommendations, it is adequate to "keep up" with the industry standards and trends, but believe their company is "not ready for the 'bleeding

4.4.2 Quantitative Findings

As part of the quantitative customer survey, respondents were asked to rate the courses they participated in on a variety of indicators. On a scale of 1 to 5, where 1 is "poor" and 5 is "excellent," on almost all indicators, CTAC seminars and workshops receive ratings of over 4, as Table 4.8 indicates.

CTAC receives consistently high ratings across most of the variables measured, as would be expected based on the qualitative data. CTAC has carved out a particular area in which it has developed the capacity to provide a valuable service. CTAC appears, at least to its customers, to be well defined, highly targeted in terms of its intended purpose, its curriculum, and its potential audience. It is not surprising for those reasons alone to see relatively high and consistent ratings by customers across a number of factors that are closely aligned with the program's mission, and it would be unreasonable to predict that CTAC would receive low ratings on these variables.

In order to put the apparently high ratings into perspective, it is useful to compare the ratings with the ratings received by CTAC in the past from a similar group of customers. In 1994, Hagler Bailly conducted research designed to evaluate CTAC, and almost identical (although slightly higher) ratings were achieved on six similar dimensions. At that time, 136 workshop participants were asked to evaluate the CTAC seminars, and it received ratings of 4 or 5 by at least 85% or more of the respondents on five of the six dimensions assessed. On the dimension that received the lowest rating in 1994 (only 82% gave a rating of 4 or 5 to the program for "the amount of time the course lasted") CTAC continues to receive relatively low ratings (only 77% gave CTAC seminars a rating of 4 or 5 on this dimension on the current survey).

Table 4.8: Evaluation of CTAC Seminars and Workshops

	Mean Rating	Top 2 Boxes	(N)
Technical knowledge of the instructor	4.6	92%	180
Clarity of the information provided	4.4	87%	180
Teaching skill of the instructor	4.3	87%	180
Technical level of information provided	4.3	86%	180
Objectivity of the information	4.2	82%	179
Usefulness of demonstrations	4.1	79%	177
The amount of time the course lasted	4.1	77%	177
"Cutting edge" or "state-of-the-art" information that was provided	4.1	76%	178
Convenience of the course in terms of location and schedule	4.0	67%	180*

*Since a few respondents rated more than one course, the numbers are occasionally higher than 175

Respondents were probed in more depth about the usefulness of CTAC seminars on several additional dimensions: including assisting participants in purchasing energy-using equipment, in making future purchase decisions, in making future modifications or upgrades of existing equipment, and in explaining their purchase rationale to others in their company. As Table 4.9 illustrates, among those respondents who were able to answer these questions, CTAC typically received mean ratings of 4 on the same 1 to 5 scale (where 1 is "poor" and 5 is "excellent").

Table 4.9: Usefulness of CTAC Seminars and Workshops

	Mean Rating	Top 2 Boxes	(N)
The usefulness of the information for you when you purchased energy-using equipment for your facility	3.9	70%	138*
The usefulness of the information for you in making future purchase decisions regarding energy-using equipment for your business or facility	4.0	75%	144
The usefulness of the information for you in making future modifications and upgrading existing energy-using equipment for your business or facility	4.0	72%	152
The usefulness of the information in helping you explain to others in your company the rationale behind certain choices	4.1	80%	168

* These questions were skipped for those respondents whose job responsibilities did not include the attribute measured. As a result, the number of respondents on any given question may be less than 175.

The data were examined to see if participants' evaluations of CTAC seminars and workshops varied among those with more or less experience, or among those with varying types of job titles or responsibilities. The ratings of CTAC seminars and workshops are remarkably consistent across the various segments of the customers served, and no statistically significant differences were found.

According to participants, CTAC courses meet or exceed its customers' expectations over 90% of the time, as Table 4.10 illustrates.

Table 4.10: Expectations for CTAC Seminars and Workshops

	Customer Responses	
	(N)	**%**
Seminar exceeded expectations	50	28
Seminar met expectations	113	63
Seminar fell short of expectations	16	9
Total	**180***	**100%**

* Respondents may have evaluated more than on course; as a result, there are more than 175 responses to this question.

CTAC seminars are most likely to exceed the expectations of participants who have the most experience in their current jobs, (about one third of the respondents with more than 5 years experience in their current job say that CTAC exceeded their expectations); and participants who are responsible for both management and maintenance of multiple buildings, (about one third of those respondents who are responsible for both building management and maintenance, and just over one third of those respondents with management or maintenance responsibility for more than 5 buildings report that the courses they took exceeded their expectations).

It should also be noted that there were a few participants who felt the CTAC seminars fell short of their expectations. Those participants who found the experience disappointing are likely to have management responsibility for only one building, to be among the less experienced and to be managers rather than executives, engineers, or technicians.

4.5 INFLUENCE OF INFORMATION OBTAINED THROUGH CTAC SEMINARS

This section provides insight into the influence of the information obtained through CTAC seminars and workshops of customers' actual as well as anticipated decisions regarding energy-using equipment and energy management practices.

4.5.1 Qualitative Findings

As part of the initial qualitative investigation, respondents were asked simply to discuss how, if at all, they believed their experience with CTAC influenced their recommendations or purchases. Respondents typically explained that they learned about new energy-efficient technologies that they otherwise would not have noticed, and that they installed more energy-efficient equipment whenever feasible as a result.

Many respondents describe their jobs as "crisis management," or "putting out fires." However, most still have to make purchase decisions and justify those decisions to their management. Almost all respondents report that they purchase energy equipment differently now than they did prior to their participation in CTAC's seminars and workshops. For example, almost all respondents believe that they purchase more efficient lighting systems as a result of CTAC input; while prior to the course, they would simply have changed out lamps with similar lamps, they now change out entire ballasts with the understanding that the energy efficient ballasts will "pay for themselves" within a reasonable amount of time. The following comments are illustrative:

- "*The HVAC course was excellent. We weren't even aware of some of the technologies that were out there until we took the course*."
- "*We installed different outside lighting [in the parking lots] because they showed how the light would work and it was great because we learned about a completely new lighting. We actually changed our behavior based on this*."

4.5.2 Quantitative findings

Anticipated Influence

Like the qualitative battery of questions, telephone survey respondents were asked to specify whether CTAC seminars and workshops influenced them in very specific areas, and how, if at all, their actual purchases and installations were effected as a result of their experience as a participant in CTAC's seminars. As the discussions below illustrate, CTAC clearly functions as an important influencer in moving its customer base in the direction of installing and using more energy-efficient equipment.

As part of the telephone survey, participants were asked to respond to a series of statements designed to measure the effects of CTAC seminars on their awareness and usage of energy-efficient practices and equipment. In an effort to measure whether the effects of CTAC are lasting, respondents were asked two questions designed to measure whether they continue to use or refer to the information they gained through their participation in CTAC seminars, or whether the information has "faded" over time.

Respondents were asked to use a 1 to 5 scale, where 1 means "strongly disagree" and 5 means "strongly agree" to respond to a series of questions. Table 4.11 summarizes the responses to this battery.

As illustrated, CTAC clearly raises the level of interest and concern regarding energy efficiency among its customers. Over two-thirds of the participants state that their participation in CTAC seminars has:

- Increased their likeliness to specify energy-efficient equipment when given the opportunity;
- Increased their awareness of new technologies or practices;
- Increased their interest in long-term energy efficiency; and
- Increased their awareness of alternative solutions.

Over half of the participants state that as a result of their participation in CTAC seminars, they have:

- Increased their understanding of payback;
- Increased their ability to communicate the benefits of energy-efficiency internally within their own organizations; and
- Increased their understanding of how they can improve the energy-efficiency of their existing facility's equipment.

Although fewer participants believe that their participation in CTAC seminars has resulted in an actual policy change within their organization, it is significant that close to half of the participants report that their participation has made a difference in their organization's policy toward the utilization of energy-efficient equipment.

Table 4.11: Impact of CTAC Seminars on Energy Equipment Purchase

	Mean Score	Top 2 Boxes	N
As a result of attending a CTAC seminar, I am more likely to specify energy-efficient" equipment when I have a choice	4.3	82%	172*
As a result of attending a CTAC seminar, I am more aware of new technologies or practices	4.0	72%	174
As a result of attending a CTAC seminar, I am more interested in long term energy efficiency	4.0	71%	173
As a result of attending a CTAC seminar, I am more aware of alternative solutions	3.9	71%	174
As a result of attending a CTAC seminar, I better understand how to work with existing equipment at my facility	3.7	57%	171
As a result of attending a CTAC seminar, I better understand payback issues	3.6	56%	171
As a result of attending a CTAC seminar, I can "sell" energy efficiency to my own management better	3.6	60%	168
As a result of attending a CTAC seminar, my company has changed or will change some of its policies	3.1	43%	166
Sustainability	**Mean Score**	**Top 2 Boxes**	**N**
I still continue to use or refer to the information I received	3.8	64%	172
Over time, the information has faded in my memory and I find that I seldom use or refer to what I learned	2.3	15%	170

* These questions were skipped for those respondents whose job responsibilities did not include the attribute measured. As a result, the number of respondents on any given question may be less than 175.

There are, of course, numerous ways to interpret these findings. For example, while many respondents indicate that they have influenced their companies' energy policies as a result of the information or knowledge they obtained through their participation in CTAC seminars, many others (in fact, more than half of the respondents) did not indicate that they have had this affect upon their companies' energy management policies. In addition, although respondents report that CTAC program have influenced them in one way or another, the data simply do not allow an analysis that measures the singular affect of CTAC market interventions independent from other possible sources of influence (e.g., company energy management budgets, procurement and contractual obligations, site or energy usage constraints, and so on).

Nevertheless, the data do clearly suggest that CTAC is at least one important source of influence and appears to make an impact on the energy management decisions of its participants.

The data were examined to see if the increase in levels of awareness and orientation toward energy-efficiency as a result of CTAC varied among those with more or less experience, or among those with varying types of job titles or responsibilities. The effects of CTAC seminars and workshops are remarkably consistent across the various segments of the customers served, and no statistically significant differences were found. However, some slight but consistent variations appeared:

- The effects of CTAC appear to be weaker among executives and more strong and enduring among engineers, although the mean responses between these groups and the total sample are within .1 to .4 on most of the questions asked;

- The effects of CTAC appear to be more stronger and more enduring among participants with 3 to 5 years experience in their jobs, and among participants whose job function focuses on building maintenance;

- The effects of CTAC appear to be slightly stronger and more enduring among participants who were motivated to participate in CTAC because they were already in the process of upgrading or replacing the equipment in their facility; and

- There were no consistent differences between those who had attended one CTAC seminar and those who had participated in more than one CTAC seminar, nor were there any consistent differences between participants who managed single vs. multiple facilities.

Following the lead of the *Guidelines* suggested by the Market Effects Subcommittee, an effort

- On a qualitative level, it was clear that <u>even after several months or a year had passed since their participation in CTAC, respondents were able to speak about the program without hesitation.</u> During the course of the interviews, several respondents got up and removed CTAC materials from their bookshelves and referred to specific dog-eared pages, marked-up Post-it Notes, business cards taped to the folders, and their clipped in hand-written notes.

- In support of the qualitative findings, the survey data suggest that <u>even after up to 2 years, two-thirds of the CTAC participants still continue to use or refer to the information they received, and only 15% believe that the information has "faded in their memory" over time</u>.

Actual Influences

In order to obtain a more accurate picture of the direct effects of CTAC seminars and workshops on actual installations and/or energy practices, survey respondents were asked a series of questions about their recent purchases. Specifically, respondents were asked a series of questions designed to assess the direct effects of the program. Table 4.12 summarizes the CTAC participants' responses to these questions.

Table 4.12: Impact of CTAC Seminars on Energy Equipment Purchase

	Customer Responses		
	(N)	%	Based on sample of
Purchased or upgraded lighting equipment	**85**	**52**	**163***
Received a rebate from SCE for the purchase of lighting	28	37	76
Purchased different lighting equipment than you would have if you had not participated in CTAC seminars	46	58	80
Purchased lighting that was more energy efficient	55	67	82
Purchased lighting that was less polluting	44	59	75
Purchased lighting that is different in some other way	28	35	79
Purchased lighting that you had not planned on purchasing	27	34	79
Purchased or upgraded HVAC equipment	**69**	**42**	**164**
Received a rebate from SCE for the purchase of HVAC equipment	8	14	58
Purchased different HVAC equipment than you would have if you had not participated in CTAC seminars	16	29	56
Purchased HVAC equipment that was more energy efficient	37	62	60
Purchased HVAC equipment that was less polluting	27	47	58
Purchased HVAC equipment that was different in some other way	20	34	59
Purchased HVAC equipment that you had not planned on purchasing	20	33	60

- These questions followed a skip pattern, and the nested questions were only asked of respondents who were eligible. As a result, the sample size on which the percents vary.

📖 The sample size in each case does not include non-responses or missing data.

- **Purchased or Upgraded Energy Equipment.** Not surprisingly, given their earlier statements about the effects of CTAC on their understanding of and knowledge about the benefits of energy efficiency, close to half of the participants report that their companies have recently purchased or upgraded their lighting equipment. Close to 40% of the participants have recently purchased or upgraded the HVAC equipment at their facility. Many have purchased or upgraded equipment regulating indoor air quality or water-using equipment, and one in ten have purchased or upgraded waste disposal equipment.

- **Received SCE Rebate for the Purchase of Energy Equipment.** About one-third of the respondents who upgraded their lighting (or about 15% of the survey participants) received a rebate from SCE for the purchase of energy efficient lighting equipment; and several of the respondents who upgraded their HVAC systems (or about 5% of the survey participants) received a rebate from SCE for the purchase of energy efficient HVAC equipment. The extent to which participation in CTAC seminars influenced participation in the rebate program cannot be determined from this data.

- **Purchased Different Equipment as a Result of Participation in CTAC Seminars.** Just over half of the respondents who upgraded their lighting stated that as a result of their participation in CTAC seminars or workshops, they purchased equipment that was different than what they would otherwise have purchased. These respondents were asked to specify how the equipment was different. Table 4.13 below summarizes these findings. The majority of these upgrades were to obtain a lighting system that was more energy-efficient or less polluting. Specifically, respondents stated that they wanted to save wattage, or save energy, or that they were interested in obtaining lighting that was of a particular color, or represented a new technology.

About one third of the respondents who upgraded their HVAC system stated that as a result of their participation in CTAC seminars and workshops, they purchased equipment that was different than what they would otherwise have purchased. As illustrated, the majority of these upgrades were to obtain a more energy efficient or less polluting HVAC system. Respondents stated that they were interested in obtaining better quality equipment, more efficient equipment, or the equipment offered better controls. The reader is reminded that the actual numbers of respondents in these categories are small; no additional analysis of this data yielded useful information.

Table 4.13: CTAC Influence on Recently Purchased Energy Equipment

	Lighting Equipment		HVAC Equipment	
	(N)	%	(N)	%
Improved color spectrum selection	5	19	1	5
Improved energy savings	8	30	2	10
Equipment utilizes new technology	3	11	1	5
Equipment was custom designed	1	4		--
Equipment utilizes different controls	2	7	2	10
	4	15	2	10
Have better knowledge of product	4	15	2	10
Purchased better quality equipment		--	5	25
Purchased more efficient equipment		--	2	10
Incorporated equipment purchase into ongoing upgrade program		--	3	15
Total	**27**	**100%**	**20**	**100%**

- **Change in Operational Practices.** In order to further assess the market effects of CTAC seminars and workshops, respondents were asked whether their participation in CTAC has affected how their business uses any of its equipment. Those who answered in the affirmative were asked to specify whether they changed the way they operated their

lighting, HVAC, or some other system. About one third of the participants indicated that one effect of the program has been to influence their usage patterns of energy equipment.

Table 4.14: Impact of CTAC Seminars on Equipment Usage

	Customer Responses (N)	%
Participation in CTAC seminars has affected how my business uses its energy equipment	68	40% of 169 respondents
As a result of CTAC participation, we have changed the operations of our lighting system	47	69% of 68 respondents
As a result of CTAC participation, we have changed the operations of our HVAC system	22	32% of 68 respondents

Over one third the participants, or about 47 respondents, stated that as a result of their participation in CTAC seminars, they changed the way energy using equipment was used at their facilities.

About half of these respondents stated that they changed the way they now operate their lighting equipment (including bulbs, fixtures, and ballasts). Less common was a change in the way these respondents now operate their HVAC systems; about one fifth of these respondents mentioned changing the way they operate their HVAC system a result of CTAC seminars.

Respondents were probed to describe how they changed their operation of their energy equipment or systems, and their responses included the following:

- Now make more use of controls, sensors and automatic equipment;
- Have switched to T8 lighting**,** or florescent and/or halogen lighting;
- Now use the current system more efficiently or have upgraded equipment to a more efficient system;
- Have modified the boiler operations; and
- Using less CFCs as coolants .

4.6 CUSTOMER SUGGESTIONS FOR ADDED VALUE TO CTAC SERVICES

Throughout both the qualitative and quantitative research, respondents had various suggestions or comments regarding additional services, enhancements, or improvements that they would like to see CTAC incorporate into its present program.

4.6.1 Qualitative Findings

Participants were able to identify areas in which CTAC could improve its performance as well as a number of additional services they would like to see CTAC offer to augment its current offerings.

The following "complaints" surface regularly when respondents are asked to evaluate their experience with CTAC.

- CTAC workshops and seminars are too "basic," and focus on problems and issues of importance to novices or others who require an "introductory" level of instruction. Many respondents expressed an interest in taking "advanced" or "special topics" courses from CTAC. Some of the special topics include insulation techniques, building materials, sensors (i.e., lighting and temperature sensor technology), and safety.

- Materials and hand-outs are of uneven quality. In preparation for their scheduled interview, many respondents had reviewed their CTAC materials, and had paper clips and "Post-It" notes flagging various items they thought needed improvement. Respondents asked for color graphics, diagrams, charts and figures (i.e., "less text and more oomph" as one respondent stated). One respondent suggested that CTAC employ a professional technical writer.

- Several respondents commented that CTAC is "a big secret," and its lack of presence can present a problem. These respondents believe that CTAC should be "more aggressive in getting the word out about itself" and should publicize the success stories of people who have attended CTAC and made changes in their facilities as a result. Respondents generally thought that the CTAC brochure is not memorable, and that CTAC could do a better job of marketing its own services. Several respondents thought it would be easier for them to get permission and/or expenses to attend CTAC seminars if their "bosses" were more aware of the program and the program's benefits.

- A primary benefit of workshops and seminars to any professional is the networking opportunities that the workshop encourages. Several respondents commented that the CTAC workshop format could more successfully promote networking among participants (as well as between the participants and the instructors).

Respondents listed several areas of need for which they indicated that CTAC extensions could provide assistance or solutions.

- Keeping up-to-date is a daunting task for many professionals, and facility managers and engineers are no exception. Although they believe they were brought "up to speed" during their CTAC workshop, they believe that the technology (particularly in lighting) changes rapidly and they worry that they can quickly get out of date.

These respondents would like to see CTAC provide a regular form of dissemination of technical information. Respondents suggested newsletters (particularly newsletters that would be "customized" to very specifically address the issues of immediate importance to them), and regular "open houses" where CTAC would hold short on-site briefings of new products and technologies.

Several respondents also believe that their efforts to keep up-to-date would be facilitated if CTAC would provide an internal contact person who they could call with questions that arise after the workshop. While some respondents are very organized and carefully label and file all workshop materials, others "file them away somewhere" and when they have an opportunity to utilize information or knowledge they acquired at CTAC, they have "forgotten some detail." These respondents would like CTAC to identify specific staff members they can contact; in fact, some respondents would like CTAC to provide staff assistance at the customer site on an appointment or fee basis.

One of the strengths of CTAC workshops, according to many respondents is the diversity of the workshop participants. At the workshops, participants interact with professionals with both more and less experience than themselves, and with professionals who face many different and varied on-the-job challenges. However, when probed, respondents admit that although this is a valuable benefit, it is a two-edged sword; although the diversity of workshop participants results in a slate of interesting questions and issues, participants can find that their specific questions, problems, concerns, or issues are not shared. These participants suggest that CTAC experiment with seminars that are targeted to specific industries (e.g., hospitals, hotels, office space, warehouse management, and so on) with the objective that members of the seminar will have more experiences to share with one another.

Finally, a few participants indicated that they had some "confusion" regarding the relationship with CTAC and SCE. This was always mentioned in the context of "customized service" and the need for audits. Every respondent had some experience with (or at least was aware of) some SCE audit, rebate, or special rate program. When asked how CTAC could provide improved customer support, respondents were curious whether or not CTAC could access their SCE records and somehow integrate this specific customer knowledge into either the seminar experience or into further on-going support programs.

To summarize the qualitative findings, respondents expressed interest in the following additional CTAC services:

- ongoing contact, particularly with an identified individual;
- programs that support ongoing (and probably informal) utilization of the CTAC demonstration lab capabilities, particularly in ways which they could involve additional (perhaps managerial) people from the customers' organization;
- ongoing update of new product information, such as newsletters, or new product or technology open houses; and
- offer more advanced classes and additional specialty workshops.

4.6.2 Quantitative findings

As a follow-up to the qualitative findings, respondents to the telephone survey were asked if there was any way CTAC could help them. Table 4.15 summarizes the responses to this question.

Table 4.15: Customer Suggestions for Enhanced CTAC Services

	Customer Responses (N)	%
Nothing more that CTAC can do	44	25
More detailed information through higher level courses; provide more classes more often	40	23
On-going technical support	23	13
Someone readily available to answer questions	18	10
Offer update information about new technologies	40	23
Other	10	6
Total	**175**	**100**

As shown, one quarter of the participants stated that there was nothing more CTAC could do for them, and indicated that they were satisfied with CTAC services the way they currently are.

Additional services suggested by respondents during the telephone survey paralleled the comments made by participants in the qualitative research, and include:

- More detailed information offered through higher level courses, or provide more classes more often;

- Continuing on-going technical support or providing CTAC staff who is available to answer questions that can arise on-the-job; and

- Development of a process to provide regular updated information about new technologies .

CHAPTER 5
DETAILED TRADE RESEARCH FINDINGS

This chapter presents the results of qualitative research completed with key industry insiders and trade representatives (i.e., manufacturers, distributors, and vendors). As described in Chapter 2, in-depth telephone interviews were completed with 48 lighting and HVAC manufacturers, distributors, and vendors. Copies of the discussion guide used to conduct these interviews, along with complete summaries of each of the 48 interviews are contained in Volume II: Appendices.

The synthesized results of these interviews are presented in the sections that follow and are organized around four main discussion areas:

- Key characteristics that describe the operational background and industry perspective of the trade representatives included in our sample;
- Perceptions of the barriers facing the current market for energy efficient lighting or HVAC equipment;
- Factors they believe have historically influenced the overall market for energy efficient equipment and speculation on the factors that will influence markets in the future; and
- Suggestions regarding how the market for energy-efficient equipment can be increased.

5.1 PROFILE OF TRADE RESEARCH SAMPLE

As mentioned above, the sample design for the trade research was designed to obtain input from a limited number of individuals representing a wide variety of businesses, as summarized in Table 5.1.

Table 5.1: Sample Design

	Lighting Industry	HVAC Industry	Total
Manufacturers	4	4	8
Distributors	10	10	20
Vendors	10	10	20
TOTAL	24	24	48

The sample included both small to very large businesses that have been operating within Southern California markets for many years. The individuals interviewed represented business owners, department and/or territory managers, and sales representatives who have been employed with their current company for several years. By design, all of the businesses included in the sample provide service to the commercial lighting and HVAC equipment markets. Most also either serve or have a division that serves the residential market either directly or through contractors or builders specializing in the residential market.

The reader should be cautioned that the manufacturer, distributor, vendor survey sample is not a large, randomly selected sample, and care should be exercised in generalizing from a small, qualitative sample. The sample was designed to give a "snapshot" of the experiences and perceptions of a large market. Although the interviews were apportioned in order to obtain input from a relatively wide range of respondents, the results are not statistically generalizable to the larger population as would be a larger, quantitative sample. That said, within the two primary categories surveyed (i.e., among the 24 lighting manufacturers and tradespeople, and the 24 HVAC manufacturers and tradespeople), responses were very consistent internally and agrees with data obtained from similar studies of the same issues among similar populations.

5.2 PERCEIVED BARRIERS TO THE ADOPTION OF ENERGY-EFFICIENT EQUIPMENT

Respondents were asked to discuss barriers to the adoption of energy-efficient lighting or HVAC equipment. The question was introduced as follows:

> The main purpose of this interview is to help SCE understand the market for energy-efficient lighting equipment – for example, we want to understand the extent to which there have been permanent changes in the market for high-efficiency lighting equipment over time, and the extent to which there has been changes in the behavior of market actors that have resulted in greater adoption and penetration of energy-efficient lighting options. These market actors include companies such as manufacturers, distributors, lighting system designers and specifiers, installation contractors, and the ultimate equipment end-users.
>
> What do you think are the most significant barriers facing the current market for energy-efficient lighting equipment? [*Probe: Any others*?]

Verbatim answers were recorded to this initial question. The interviewer then asked each respondent to discuss a series of specific barriers.

> Now, I'd like to discuss with you several factors that may have changed over time, influencing the market <u>in general</u> for energy-efficient lighting products and services. Also, I'd like you to tell me what you think these changes can be attributed to. *[Probes: To what do you attribute this change? How do you expect it to change over the next five years? To what do you expect to attribute this change?]*

Respondents were asked to respond to the following list of potential market barriers:

- Awareness of, and interest in, energy-efficient lighting equipment
- Acceptance of, or confidence in, energy-efficient lighting equipment
- Sales and promotions of energy-efficient lighting equipment
- The relative price differences between standard and energy-efficient lighting equipment
- Delays in obtaining energy-efficient lighting equipment
- Customer (end-user) awareness of energy-efficient lighting equipment
- Customer (end-user) demand for energy-efficient lighting equipment
- Customer (end-user) acceptance of, or satisfaction with, energy-efficient lighting equipment

Finally, respondents were asked to respond to a set of factors that "may have influenced the market for energy-efficient lighting/HVAC equipment over the past five years." Respondents were asked to rate each one of nine factors in terms of the influence they thought each has had upon the shift toward more energy-efficient lighting or HVAC equipment using a 1 to 5 point scale, where 1 corresponded to "no influence," and 5 corresponded to "a great deal of influence." These factors included:

- The creation and expansion of utility conservation or demand-side management programs that offer rebates or other financial incentives
- Changes in state and local building codes and regulations
- Changes in Federal building codes and regulations
- Rising energy prices
- Environmental concerns of commercial and industrial customers
- Improvements made in energy-efficient lighting products
- Reductions in the prices of energy-efficient lighting products
- The respondents' efforts to market energy-efficient lighting systems
- Utility educational/informational programs

This chapter will first summarize the unaided verbatim responses to the initial open-ended question and will report specific responses to each of the barriers which were further probed in the interview.

Although in some cases, both lighting and HVAC industry insiders identify similar barriers to adoption of energy-efficient lighting or HVAC equipment, the markets, products, the distribution systems, and efficiency criteria for energy-efficient lighting and HVAC equipment are different enough to require separate treatment.

5.2.1 Barriers Identified by Lighting Manufacturers

Lighting manufacturers believe that lack of awareness at all levels throughout the distribution system continues to be a barrier to adoption of energy-efficient lighting equipment.

Lighting manufacturers believe that lack of knowledge and awareness of the long-term benefits of energy-efficient lighting at all levels of the distribution system acts as a frustrating barrier to the adoption of energy-efficient lighting.

- *"There is a certain amount of frustration, because we can make a quality product, one that will deliver on its promises of high efficiency, we can distribute that product in a cost effective manner, we can promote that product, we can back that product, but the one thing we can't do is get anybody to care."*

- *"[Customers] are so busy doing their day-to-day business that they don't have the time to*

- *"The payback is still not something that the customer sees as 'real money'."*

Manufacturers complain that it is difficult to train sales staff at the distributor and contractor levels about energy efficiency. One manufacturer, for example, has implemented training programs simply to encourage distributors and contractors to suggest efficient technologies in upgrade situations, and reports that even this task is very difficult to accomplish.

- *"Most counter people are not aggressive enough, or interested enough, to even make a*

Beyond trying to distribute information regarding energy-efficient lighting options, manufacturers find that one of the biggest challenges is educating the *correct* people and report that they have

had difficulties reaching actual decision-makers. "Facilities people" who understand efficient lighting are not the ones making the decision and often a company's facilities staff do not feel confident that they are in a position to push for these more expensive systems.

- *"We're finally getting the knowledge to the maintenance people, but they aren't the decision-makers. When it comes down to an major energy project, you have to get up the ladder. Get the information to the CEO, the President. These people do not have the knowledge."*

5.2.2 Barriers Identified by Lighting Distributors and Vendors

Distributors and vendors identify lack of awareness of the benefits of efficient lighting as a significant barrier to adoption of energy-efficient equipment. However, they are of mixed opinion about whether concerns about costs are a function of lack of awareness or are in fact a decision on the part of their customers not to "invest" in the higher first costs of more efficient lighting even when they understand and can calculate a known payback.

Like manufacturers, distributors and vendors believe that a significant barrier to increased institutional use of energy-efficient lighting is lack of awareness among their customer base of the benefits of efficient lighting equipment.

- *"Not everybody can understand that in the long-run, a larger up-front investment can save or make you money. I can't blame them. Here, we've all taken classes and been taught*

- *"You're trying to sell these people something that's new to them, it's more expensive, and they don't understand it. That's a tough sell."*

- *"We can't educate people unless they come in here, so it's not really our place. I think it is up to the utility to educate the public, and that would make it easier for the contractors and the distributors to sell [efficient equipment]."*

Like manufacturers, these respondents believe that the most significant barrier to increased institutional use of energy-efficient lighting is a lack of understanding of the benefits of energy-efficient lighting equipment across the board, as the following comments illustrate.

- "*Probably half of my customers ~~-~~that's end-users and customers--understand efficient lighting, and how it can help them out."*

- *"About half of the contractors are not aware of efficient lighting, and the other half don't care. It's just not a selling point for them. When it comes to a contractor, his concern is how easy it will be to get the job done, not how efficient it can be."*

- *"If people understood, or could see for themselves, how nice energy-efficient lighting could look when it's done properly, that would really make an improvement. If someone could go in and sit down and spend a little time with [the customers], I think more of them would go with [energy-efficient lighting].*"

- *"There is confusion from the manufacturers on down to the customer base. Nobody knows what is best for them. In the last five years, the market has been bombarded with information about efficiency, and now everyone is trying to sort it out."*

Distributors and vendors consistently state that the most significant barrier to increased institutional use of energy-efficient lighting is, as one respondent stated, "a matter of simple economics." One distributor stated that most of his customers understand the benefits of efficient equipment, but still are unwilling to spend the extra money on the up-front cost. He believes that his customers are aware of the benefits of energy-efficient lighting and have sufficient knowledge on which to base an informed decision, but they do not want to incur additional costs.

- *"It's a fact of life most people aren't willing to pay more now for more later."*

- *"You can blame it on whatever you want, but it really just comes down to simple math. People see the higher price, and some of them aren't going to pay it. It doesn't matter how much [money] they will save."*

Other distributors and vendors, however, believe that customers who understand the benefits of energy-efficient lighting will ultimately make a more efficient lighting choice, and reiterate that while many businesses are not aware of the payback they can receive from energy-efficient lighting, if you can "sit down and lay out the numbers," commercial customers will typically choose the energy-efficient lighting over standard efficiency lighting.

- *"It's just a matter of getting the message across. These people don't want to listen to a word you say until you start talking dollars."*

Most distributors and vendors believe that barriers stemming from lack of understanding about payback are becoming less of a factor as the costs of energy-efficient lighting become comparable with the costs of less efficient equipment.

- *"Five years ago, electronic ballasts and T-8 lamps were pretty darn expensive, and compact fluorescent fixtures were very expensive. Now you're only talking about a couple bucks more, so more people are willing to go this route. Efficiency always made sense,*

but it makes even more sense now."

Other barriers mentioned primarily by distributors is that decision on lighting efficiency is not made by the end-user (who will ultimately reap the benefits), rather is made at an earlier point in the distribution structure by a person whose immediate goal is to control initial costs.

- *"If it's not required or specified the contractor does not care. They're just going to appease the end-user by bidding at the lowest cost items."*

Along these lines, one distributor pointed out that many of the structural barriers to adoption of energy efficiency are not as significant in institutional work, but are actually much more significant in commercial and industrial work where the owner makes the decision. On the other hand, another distributor stated that on the municipal side, most school and municipality budgets are structured such that they favor low up-front costs, not long-term investments like energy-efficient fixtures.

One respondent stated that regardless of whether end-users are commercial or municipal entities, he has found that willingness to invest in energy-efficient lighting equipment is increasing as the economy prospers, and believes that businesses are making energy choices that are sound over the long-term.

Another issue that respondents mentioned as a factor affecting the energy-efficient lighting market is the deregulation of the electric energy industry. Some distributors and vendors are concerned that deregulation may make it more difficult to sell energy-efficient lighting because payback periods will get longer if energy prices drop. However, even with lowered projected energy costs, these respondents believe that paybacks should still occur within 1 to 2 years for most systems; conversely, if electricity rates go up, there will be "more incentive for people to choose efficient

Although the survey instruments asked respondents to discuss market barriers, some respondents insisted that there are no significant barriers to efficient lighting today.

- *"We're seeing more and more of it* [energy-efficient lighting installations], *and people are getting more and more knowledgeable about it, and from the way our business is going I don't see any barriers. We have seen a tremendous difference in the past 5 years."*

One respondent attributes this difference to utility programs and the Greenlights program and stated that he believes the current trend in the market for efficient lighting will continue.

- *"From my 33 years in the industry, I know that fixture manufacturers are very slow to react until they are forced into it. Some of these programs have forced them into efficient lighting."*

5.2.3 Barriers Identified By HVAC Manufacturers

HVAC manufacturers identify the complexity of the purchase decision-making process and the conflicting demands and needs of the market actors at each point in the process as a significant barrier to adoption of high efficiency commercial HVAC equipment.

Most HVAC manufacturers believe that the nature of the distribution system acts as a significant barrier to increased use of energy-efficient HVAC equipment. Most HVAC manufacturers believe that end-users lack information when it comes to high-efficiency HVAC equipment and usually end up having to rely on the recommendations of contractors who generally do not push high-efficiency systems. HVAC manufacturers tend to believe that distributors and contractors could benefit from more information and training regarding efficient HVAC systems, and that the lack of understanding of or ability to calculate payback on the part of contractors is a barrier to the adoption of high efficiency HVAC systems.

- *"The contractor puts a bid on the project. The project has to be done under budget. The contractor is looking for the lowest priced equipment."*
- *"Unless [the end-user] specifically demands the higher efficiency, they're not going to*
- *"You have to overcome the up-front cost, but with the help of rebates like Edison's, it*
- *"With commercial HVAC equipment, you can't always show a payback. That varies from case to case, but even if you can demonstrate a payback, it still often doesn't matter."*

One manufacturer with a different opinion stated that the most significant barrier to increased use of energy-efficient HVAC equipment is finding a way to comply with Federal environmental regulations.

- *"Customer awareness is easy. The regulatory stuff is what kills us. The regulatory agencies need to tell everyone what they are trying to accomplish, and then we can all find a way of making that happen."*

In addition, one manufacturer added that another barrier to increased use of energy-efficient HVAC equipment is motor/compressor efficiencies. All of the equipment this company manufactures has a premium efficiency motor, and they also oversize their condensers. This

respondent that they are "working on it," and stated that they would like to make even more efficient models.

5.2.4 Barriers Identified by HVAC Distributors and Vendors

Like manufacturers, HVAC distributors and vendors believe that the complexity of the purchase process and the lack of awareness (or even agreement) on the benefits of energy-efficient HVAC installations contribute to customer resistance to the adoption of energy-efficiency HVAC equipment. HVAC distributors and vendors believe that the most significant barriers to increased installations of high energy-efficiency HVAC equipment arise from the difficulty of calculating the payback from these units which exacerbates customer resistance to higher initial costs.

According to many distributors and vendors, lack of awareness and lack of interest throughout the distribution system is a significant barrier facing the current market for energy-efficient HVAC equipment. Several respondents pointed out that although there may be an overall trend toward more awareness and "push" on behalf of the manufacturers, distributors and vendors still do not sell as much energy-efficient HVAC equipment "as they should."

- *"We're in a competitive situation, and it's just flat out easier for us to sell the standard*

- *"Most of the stuff we sell to contractors is part of their plan & spec kind of business. So if standard efficiency is specified by the engineer/architect, they're going to bid at standard efficiency. There's no way they're going to even attempt to convince the GC that he ought to consider high efficiency. The only person who might care about efficiency is the owner, and in general, the A/C contractor never has contact with the owner."*

- *"[Commercial customers] aren't interested in saving money on utilities, they're more interested in saving money on maintenance. The building owner goes for the cheapest thing he can find."*

Without a clear understanding of the potential payback, distributors and vendors believe that the higher initial costs of high efficiency HVAC equipment presents a significant barrier and many complain that the high up-front cost makes it more difficult for salespeople to sell efficient models.

- *"The payback just isn't fast enough. We have to tell people realistically that if they put in a high efficiency unit they're looking for a payback of 5 to 7 years. The average business*

- *"In southern California, the climate is too mild to justify the first costs. Therefore, it is very hard to sell anybody on the payback idea."*

Lack of understanding or agreement about how to determine energy efficiency of commercial HVAC systems poses a barrier to the adoption of energy-efficient equipment to many distributors and vendors, and many identify this as one of the most significant barriers to adoption. As a result, many feel that the most significant barrier to increased use of energy-efficient HVAC equipment is the initial investment, along with lack of incentives for contractors and end-users, and lack of awareness for end-users. Many state that even when people understand the benefits of high efficiency HVAC equipment, they are generally unwilling to lay out the high initial investment.

- *"Most people just don't want to pay the extra money."*
- *"Everything is driven by cost of the equipment."*
- *"[End-users] don't have the foresight, or the incentive, to pay a higher cost up-front. You can't change the foresight, so you have to give them an incentive."*
- *"If you could bring [efficient units] down cheaper so people could actually afford them,*
- *"Right now, there is no incentive to the building owner or tenant to make it worth their while to upgrade to more efficient equipment."*

Some respondents stated that the most significant barrier to increased use of energy-efficient HVAC equipment is equipment availability. They report that some manufacturers (Amana and Rheem were mentioned in this regard) have not begun production of high efficiency commercial HVAC models. These companies offer 10 and 11 SEER units, but not the 12, 13, or 14 SEER units.

- *"The market for efficient equipment has stayed the same for many years. Trane & Rheem have come out with new units, but they are not necessarily more efficient. The only way I can sell efficiency to C&I customers is to sell them the controls that will cut down on run time for the equipment."*

Some distributors state that due to the lack of availability they do not sell any high efficiency units unless the contractor can wait for up to a year for delivery. They report that some of the manufacturers have announced they will begin making higher SEER units within 6 to 9 months, and are hopeful that they can begin selling the high efficiency units at that time.

- *"If you're going to buy a unit that is 7.5 tons or more, you're going to have to buy what you can get, which is going to run about 9 SEER."*

- *"Over the years, the modifications have helped some, but I can't take an air conditioner out, and put a new one in, and have it TRULY operate at half the electricity consumption. It's more like maybe 10% less consumption. So despite the fact that the manufacturers do have some new models, they have not come up with a model efficient enough to justify the up-front cost to the customer."*

One respondent stated that this barrier has become more significant over time. He has no confidence in the new "efficient" models that manufacturers are offering because he has performed tests on them and does not believe the manufacturers' efficiency claims. Therefore, he and his staff try to sell his customers the lowest efficiency models available (10 SEER) because they are so much less expensive and not that much less efficient than the new models.

- *"We are in a bidding market, and price is everything. So if I don't believe that the new models are more efficient, why would I try to sell these models?"*

Some respondents believe that these barriers are less influential now than they were five years ago, and one respondent attributed this to the fact that "people trust the technology more," and are not as afraid of buying the first "off the line."

Some distributors and vendors are concerned about the effects of the deregulation of the electric power industry, and are worried that if deregulation lowers the cost of energy, "people may not be as interested in energy-efficient equipment."

5.3 EVALUATION OF THE EFFECTS OF SPECIFIC BARRIERS

After respondents were given an opportunity to identify the factors they believe present significant barriers to adoption of energy-efficient lighting or HVAC equipment, they were asked to respond to a set of several possible influential factors, including:

- Awareness of, and interest in, energy-efficient lighting equipment
- Acceptance of, or confidence in, energy-efficient lighting equipment
- Sales or promotion of energy-efficient lighting equipment
- The relative price differences between standard and energy-efficient lighting equipment

- Delays in obtaining energy-efficient lighting equipment
- Customer (end-user) awareness of energy-efficient lighting equipment
- Customer (end-user) demand for energy-efficient lighting equipment
- Customer (end-user) acceptance of, or satisfaction with, energy-efficient lighting equipment

In addition, respondents were asked to rate on a 1 to 5 scale (with 1 being "no influence," and 5 being "a great deal of influence") a set of factors that may have influenced the overall market for energy-efficient lighting or HVAC equipment.

In a few cases where both lighting and HVAC industry insiders responded similarly to the set of questions regarding their perceptions of barriers to adoption of energy-efficient lighting or HVAC equipment, the issues and concerns that were raised and the ratings given were different enough to require separate treatment.

5.3.1 Perceptions of Lighting Manufacturers

Lighting manufacturers believe that awareness of, and interest in, energy-efficient lighting equipment can be expected to increase over time.

- *"I'm trying to bring products into our development cycle and get them into the market. I know that efficiency is a selling feature you want to have on a new product."*
- *"Five years ago, efficiency wasn't the buzzword that it has become today."*
- *"It's been a major emphasis of our company for years."*
- *"It is the future of the business."*

These respondents believe that acceptance of energy-efficient equipment has always been high and can be expected to increase. One respondent who identified his company as the "Greenlight ally of the year," stated that increasing the public's confidence in energy-efficient lighting equipment was a major focus for his company.

Manufacturers believe that there is increasing competition in the market to develop high quality energy-efficient lighting and, as a result, anticipate that the sales and promotional activities for these products will increase, and the relative price difference between standard and energy-efficient equipment will decrease.

- *"A lot of the controls packages have become more competitive because there are more players out there. There is some new technology in industrial lighting that are much less*

expensive than the controls - so price competitive things have become more of a commodity"

- *"The gap has been shrinking slowly for years."*
- *"The production has gone up, the price has come down."*

Manufacturers claim that delays in obtaining energy-efficient equipment are "virtually non-existent" with the exception of occasional delays on "brand-new products."

Manufacturers also anticipate that end-user awareness of, and demand for, energy-efficient equipment has been increasing and will continue to increase. However, most manufacturers believe that awareness is spotty, and is most likely to be highest among trade allies who read trade magazines, trade journals, and participate in educational programs offered by professional organizations.

- *"There are two sides to this: plant managers who have just installed efficient equipment seem to be very astute at selecting the right systems. On the other end, sometimes I'll be at an electrical distributor speaking to contractors who have never heard of these controls."*
- *"Now, more sales people are pushing it. It's all additive, and people are being bombarded with it. If you don't read it, you're going to see it on TV or in the*
- *"I have seen awareness increase slightly, but not as quickly as I anticipated it would. Rebates helped significantly in some markets."*
- *"Awareness is highest up among a certain type of customer who can afford the cost and who is stable enough to receive the benefits. As education permeates the higher levels of businesses, this will become more prevalent."*

Manufacturers report that energy-efficient lighting products have improved and, as a result, end-user satisfaction with energy-efficient lighting equipment is high and increasing.

As the following table illustrates, lighting manufacturers believe that the creation and expansion of utility rebate programs have been particularly influential in increasing adoption of energy-efficient lighting equipment. In addition, lighting manufacturers tend to think that rising energy prices will affect the market for energy-efficient lighting products. Somewhat less important factors include improvements in energy-efficient products, reductions in the prices of energy-efficient products, and educational/informational programs sponsored by utilities.

The ratings on the following table were based on a 1 to 5 point scale, in which respondents were

asked to utilize a score of 1 if they thought the factor was of "no influence" and a score of 5 for a factor that had "a great deal of influence" on the market for energy-efficient lighting equipment. It is important to note that the sample sizes for this segment are very small, and that these ratings should be treated as qualitative data.

Table 5.2: Influence of Barriers to Adoption of Energy Efficient Lighting: Perceptions of Lighting Manufacturers (N=4)

Theoretical Factor	Rating	Number of Responses	Explanation Given by Respondent
Creation and expansion of utility conservation or demand side management programs that offer rebates or other financial incentives	1 2 3 4 5	-- -- -- 3 1	• Raised awareness • Brought the demand curve up • Very influential, but somewhat temporary • Large impact
Rising energy prices	1 2 3 4 5	1 -- 2 1 --	• You don't see incandescent light bulbs in Japan with the power rates that they have. • If prices rose, you'd see the demand for energy-efficient lighting increase
Reductions in the prices of energy-efficient products	1 2 3 4 5	-- 1 2 1 --	• The prices haven't come down much. • Still more expensive, but it helps. • First costs have a major impact on an uninformed decision-maker.

Table 5.2: Influence of Barriers to Adoption of Energy Efficient Lighting: Perceptions of Lighting Manufacturers (continued) (N=4)

Theoretical Factor	Rating	Number of Responses	Explanation Given by Respondent
Utility educational / informational programs	1 2 3 4 5	-- -- 3 1 --	• Not really sure. Tough to measure this. • Have an effect on the "easy to affect" segment of the market. • "Hopeful."
Your own efforts to market energy-efficient systems	1 2 3 4 5	-- 1 3 -- --	• Company put much effort into marketing the bi-level system. These efforts help, but are not "earth-shattering" • Frustrating. The company spends a lot on marketing but is not convinced of the results. The company put out a large campaign for low mercury lamps. "We're in all the trade magazines, but people still don't know about it." Perhaps people are overwhelmed with information.
Environmental concerns of commercial and industrial customers	1 2 3 4 5	2 1 1 -- --	• Fits with the "mantra of big corporate partners like a WAL-MART, but without teeth, environmental concerns are rare." • Seeing more of this for larger companies who are forced to comply with certain standards. Also, they have environmental management services. Few businesses are actually "environmentally conscious." • This is a non-issue for the "vast majority of smaller companies."
Changes in state and local building codes/reg.	1 2 3 4 5	2 1 1 -- --	• There are loopholes in the standards. • Everyone gravitates towards the lowest edge - the minimum levels available. • Hits a certain segment, but only "encourages the minimum." • This doesn't impact customer's selection of equipment.
Changes in federal building codes and regulations	1 2 3 4 5	3 -- 1 -- --	• This had no impact.

5.3.2 Perceptions of Lighting Distributors and Vendors

Distributors and vendors, like manufacturers, generally believe that awareness of and interest in energy-efficient equipment is on the increase, and most believe that it will continue to increase. Some distributors believe that it has already increased to a high level and will remain at this level.

- *"The manufacturers are really pushing the efficient products now. That has helped*

- *"This is becoming more of a company-wide emphasis. People do see the savings."*

- *"Awareness has increased because there is so much competition."*

- *"The company focus, from the beginning, was on efficient products. This will not change in the next five years either. We've always been geared to sell efficient equipment."*

Lighting distributors and vendors feel that product improvements have led to increased acceptance of, and confidence in, energy-efficient equipment. Many of these respondents anticipate that products will continue to improve.

Lighting distributors and vendors have a wide range of opinions regarding the importance of sales and/or promotion of energy-efficient lighting equipment. While some state that increasing promotional activities will continue to affect the market, others believe that constraints within the distribution system mitigate the effects of promotion. While no one believes that promotional and sales efforts will decline, some feel that such efforts will not have a great impact on increasing the adoption of energy-efficient lighting.

Lighting distributors and vendors anticipate that the relative price differences between standard and energy-efficient equipment have decreased and will continue to decrease. They believe that as competition between manufacturers increases, relative price differentials will decline. Many point out that the price differentials are so small that energy-efficient lamps are "almost always asked for now." Some respondents do not agree; one respondent stated that his customers have been "spoiled by the rebates" to the point where they will not install incandescent lighting unless they get a sufficiently low price.

Lighting distributors and vendors have not experienced delays in obtaining energy-efficient equipment, and do not believe that product delays have been a market factor. These respondents typically comment on the increasing competition among manufacturers and believe that manufacturers have improved production of energy-efficient lighting equipment to remain in business.

Given these responses, it is not surprising that lighting distributors and vendors believe that end-user awareness of and demand for energy-efficient equipment has increased and can be expected

to increase.

- *"More people are starting to get wind of the reasons why efficient lighting is smarter."*
- *"I think people need to get a better understanding of fluorescent lighting. I think more people need to see the different kinds of fluorescent lighting that are available out there, whether it's commercial or residential. If people understood or could see for themselves how nice energy-efficient lighting could look when its done properly, that would really make an improvement."*
- *"It is becoming the standard. More people are requesting efficient lamps"*
- *"Demand is going up among the aware segment of the market. Those who are aware of efficient lighting demand it*."
- *"Demand is increasing because of new innovations, especially Philips ALTUS series of lamps that eliminates waste disposal costs because of the trace levels of mercury."*
- *"As price comes down further, demand will go up further."*
- *"It went up with rebates, and now is way down."*

Like manufacturers, lighting distributors and vendors believe that end-user acceptance of, and satisfaction with, energy-efficient equipment is increasing, and can be expected to increase with product improvements.

- "*It seems like every day there is a new improvement to efficient equipment. People are happy with the savings and the high quality of the products."*

The opinions of the 20 lighting distributors and vendors regarding the importance of a series of factors which might, theoretically, influence the market are much more variable than were the opinions of the four lighting manufacturers.

As the following table illustrates, lighting distributors and vendors believe that the creation and expansion of utility rebate programs have been somewhat influential in increasing adoption of energy-efficient lighting equipment. In addition, lighting distributors and vendors tend to think that reduction in the prices of energy-efficient equipment along with rising energy prices and educational/informational programs sponsored by utilities will effect the market for energy-efficient lighting products. Unlike manufacturers, some distributors and vendors believe that local and Federal regulations have an effect the market. Of less importance are factors such as improvements in energy-efficient products, reductions in the prices of energy-efficient products, environmental concerns of commercial and industrial customers, and the distributors' or vendors'

own efforts to market energy-efficient systems.

The ratings on the following table were based on a 1 to 5 point scale, in which respondents were asked to utilize a score of 1 if they thought the factor was of "no influence" and a score of 5 for a factor that had "a great deal of influence" on the market for energy-efficient lighting equipment. It is important to note that the sample sizes for this segment are relatively small, and that these ratings should be treated as qualitative data.

Table 5.3: Influence of Barriers to Adoption of Energy Efficient Lighting: Perceptions of Lighting Distributors and Vendors (N=20)

Theoretical Factor	Rating	Number of Responses	Explanation Given by Respondent
Creation and expansion of utility conservation or demand side management programs that offer rebates or other financial incentives	1 2 3 4 5 DK	-- 2 10 2 5 1	• They helped out but failed to get any message across (since the rebates are no longer available) • Helped briefly but had no tangible long-standing effects except in very large companies (national chains). • At the time, these had a large influence, but the influence has worn off. Very effective for outdoor lighting market. • Rebates help, but they probably only help the people who are going to choose efficient technology anyway. • This created the awareness and demand. • "My goodness did it ever help! We had a 20% increase in our business when the utility had rebates."

Table 5.3: Influence of Barriers to Adoption of Energy Efficient Lighting: Perceptions of Lighting Distributors and Vendors (continued) (N=20)

Theoretical Factor	Rating	Number of Responses	Explanation Given by Respondent
Reductions in the prices of energy-efficient products	1 2 3 4 5 DK	2 1 6 5 7 1	• This is the biggest thing. It gives motivation for purchase. This makes the investment that much more attractive. • This is the most important factor in the customer's [equipment selection] process. • This is the biggest thing because, like rebates, it gets the customer past the 'bottom line' concern. • Prices have been stable for some time. They have come down so far from 5 years ago but there have been no large reductions recently
Rising energy prices	1 2 3 4 5 DK	6 1 4 4 4 1	• This is important because it dictates the payback period. • Changes the payback cycle. • This makes the investment that much more attractive; makes efficiency more attractive. • I don't know that that has had much of an effect, except that a lot of people are waiting around for deregulation to see what will happen. Will affect the demand in the future. • Increases demand for efficient products. • No customer has said this was the motivation for choosing efficient equipment. Again, it depends on the size of the building.

Table 5.3: Influence of Barriers to Adoption of Energy Efficient Lighting: Perceptions of Lighting Distributors and Vendors (continued) (N=20)

Theoretical Factor	Rating	Number of Responses	Explanation Given by Respondent
Utility educational / informational programs	1 2 3 4 5 DK	1 4 7 1 4 3	• These are the best ways to reach a wide-spread audience. • I don't think they're being informed at all. I watch TV, I read the paper. I haven't heard enough about it. • They're good, but one of the problems is it is hard for small to medium sized businesses to justify the cost of sending someone to of their seminars • Only targeted to large users. • They're geared more towards the engineers and specifiers than anyone else. • Nobody will do anything until they know the facts. • These need to stay affordable for the little guy. • These need to be better and, in conjunction with rebates, to get a lasting message across.
Improvements made in energy-efficient products	1 2 3 4 5	1 2 6 8 3	• I've watched it get better and better. More options every day. • This is a huge factor but not enough people know about all the improvements. • There have been improvements, but he does not know if these changes impact the market. • Does not help increase demand or make sales, but increases satisfaction with efficient lighting. • We [contractors] can sell the efficient lamps a lot easier if they *are* only a couple dollars more expensive

Table 5.3: Influence of Barriers to Adoption of Energy Efficient Lighting: Perceptions of Lighting Distributors and Vendors (continued) (N=20)

Theoretical Factor	Rating	Number of Responses	Explanation Given by Respondent
Changes in state and local building codes/reg.	1 2 3 4 5 DK	4 3 4 6 2 1	• This is the major factor in increasing the market - make it mandatory. That's the only way. • "If an engineer has to comply with efficiency codes, it has a huge effect." • They only pertain to new structures. • With Title 24, your primary switch, when you walk into a rest room or a kitchen, has to have X many lumens 99% of the time. The fluorescent is going to give the customer the light at a low energy cost, but contractors find loopholes in this
Changes in federal building codes and regulations	1 2 3 4 5 DK	3 5 3 4 1 4	• This is the major factor in increasing the market. It raises the standard for the manufacturers down to the end-users. • National Energy Act has all but phased-out non-efficient equipment. It has made efficiency the standard.
Your own efforts to market energy-efficient systems	1 2 3 4 5 DK	3 -- 10 5 1 1	• We can only do so much. • "We have some success with converting people, but we usually can't do it alone." • "We can't have that much effect • We don't have the time to market this part of our business. • We've recently retrofitted two major projects entirely due to our internal efforts.

Table 5.3: Influence of Barriers to Adoption of Energy Efficient Lighting: Perceptions of Lighting Distributors and Vendors (continued) (N=20)

Theoretical Factor	Rating	Number of Responses	Explanation Given by Respondent
Environmental concerns of commercial and industrial customers	0 1 2 3 4 5 DK	1 8 2 5 2 1 1	• "Not in this lifetime." • "I have not come across one person who stated that their reason to get efficient lighting has anything to do with the environment. I think it's purely the bottom line." • "There is no such thing. There wouldn't be 1% of customers that care about this" • Only the government offices are worried about that. • Schools/municipalities are more concerned about this. Most business customers don't care. It's a "give me the cheapest one you've got" attitude. • Greenlights had an awful lot to do with it, as well as the oil crisis in '73. • "This is probably a solid '1' in any other state, but in CA, I give it a 3 or 4."

5.3.3 Perceptions of HVAC Manufacturers

Most HVAC manufacturers believe that awareness of, and interest in, energy-efficient equipment has increased during the past few years and anticipate awareness to increase. As one manufacturer stated, "customer awareness has quadrupled in recent years." Another manufacturer pointed out that although awareness of and concern about energy efficiency has increased in value as a "marketing tool," he is not certain whether his customers "care" about the issue. Nonetheless, all of the manufacturers interviewed for this study have focused their product development on some aspect of energy-efficient HVAC equipment design.

HVAC manufacturers point out that high efficiency equipment is no longer a "new product" and believe that acceptance of, and confidence in energy-efficient equipment is fairly high among their customers. Most allocate a considerable budget towards sales and promotion of energy-efficient equipment, and expect the importance of sales and marketing to increase as the market for energy-efficient HVAC equipment grows.

However, HVAC manufacturers are less certain about the relevance of equipment price differentials between standard and energy-efficient equipment to promotion of more efficient equipment. Although they expect the cost differentials to decrease over time they generally believe, as one manufacturer stated, "cost-cutting has to be offset by methods to get more efficiency." Another manufacturer, one whose focus has been on developing high efficiency equipment, explained that their "innovations make it less expensive to create the efficient equipment," and, as a result, he expects that cost differentials will continue to decrease.

Not surprisingly, HVAC manufacturers do not think that there are any significant delays in delivering high energy-efficient equipment. As one respondent stated, there are "no differences in delays between our standard and our efficient equipment." Another respondent replied, "If we

Manufacturers are in agreement that end-user awareness of, demand for, and satisfaction with commercial energy-efficient HVAC equipment has increased, and should continue to increase in the future. They believe that a "trend" is that "facility managers are starting to get a little smarter," and that "utility programs have helped a lot in this regard." On the other hand, one manufacturer stated that awareness within the residential sector has not increased to the degree that it has among commercial customers; his explanation is that "increased emphasis on operation cost controls is sending demand higher." All of the manufacturers stated that end-user acceptance of, and satisfaction with, high-efficiency HVAC equipment is increasing or at least that they see no difference in customer satisfaction between customers who purchase standard vs. efficient HVAC equipment.

As the following table illustrates, HVAC manufacturers believe that the creation and expansion of utility rebate programs and educational/informational programs sponsored by utilities have been among the most influential factors in increasing adoption of energy-efficient HVAC equipment. HVAC manufacturers are split in their opinions about the influence of such factors as environmental concerns of commercial and industrial customers, rising energy prices, or reduction in the prices of energy-efficient equipment, and tend to think that few other factors (including changes in state, local or Federal building codes, improvements in energy-efficient products, or even manufacturers' own efforts to market high efficiency HVAC systems) will affect the market for energy-efficient HVAC products.

The ratings on the following table were based on a 1 to 5 point scale, in which respondents were asked to utilize a score of 1 if they thought the factor was of "no influence" and a score of 5 for a factor that had "a great deal of influence" on the market for energy-efficient HVAC equipment. Again, it is important to note that the sample sizes for this segment are very small, and that these ratings should be treated as qualitative data.

Table 5.4: Influence of Barriers to Adoption of Energy Efficient HVAC: Perceptions of HVAC Manufacturers (N=4)

Theoretical Factor	Rating	Number of Responses	Explanation Given by Respondent
Creation and expansion of utility conservation or demand side management programs that offer rebates or other financial incentives	1 2 3 4 5	-- 1 -- 2 1	• Rebates probably have been a serious factor. They allow you to sell a higher-cost unit at the same price as the standard product. • The need for lower utility bills drives the market, rebates helped lower the bills. • These programs give customers incentives to choose efficient unit.
Utility educational / informational programs	1 2 3 4 5	1 -- -- 2 1	• We supply equipment to a lot of performance contractors, and several of those are tied into the utilities. We feel there will be more and more of that in the future." • Puts focus on operating costs; helps at many levels. • I've not seen any evidence of a real effect here.
Rising energy prices	1 2 3 4 5	2 -- -- 1 1	• This drives the demand for efficiency. • More people are more concerned about operation costs. • Not a factor people think about - no impending energy crunch. • Not an issue.

Table 5.4: Influence of Barriers to Adoption of Energy Efficient Lighting: Perceptions of HVAC Manufacturers (continued) (N=4)

Theoretical Factor	Rating	Number of Responses	Explanation Given by Respondent
Environmental concerns of commercial and industrial customers	1 2 3 4 5	1 1 1 1 --	• This concern is gaining momentum among large energy users - especially high-tech companies. • I see the need for it, but companies won't care unless they're absolutely forced to. You've got to hit them at their pocketbook. • We've had a small percentage of customers who want to pursue alternative refrigerants. • You get your occasional company that cares but it's not a predominant theme.
Your own efforts to market energy-efficient systems	1 2 3 4 5	-- 2 2 -- --	• We push it very hard. • We feel we are doing everything we can. • We're not helping the demand much. • Nobody wants to buy this stuff, no matter what we say.
Reductions in the prices of energy-efficient products	1 2 3 4 5	2 -- 2 -- --	• Makes payback easier to swallow • Increases sales. • Prices have not fallen.

Table 5.4: Influence of Barriers to Adoption of Energy Efficient Lighting: Perceptions of HVAC Manufacturers (continued) (N=4)

Theoretical Factor	Rating	Number of Responses	Explanation Given by Respondent
Changes in state and local building codes/reg.	1 2 3 4 5	-- 4 -- -- --	• ASHRE 90.1 - energy standard for commercial buildings - set minimum efficiencies for efficient HVAC. • The code is written to be translated into law. If it becomes a law, I would give it a 5. This takes some of the risk out of it from the manufacturer's standpoint because all of the manufacturers have to get up to the same standards. • This applies more to the smaller commercial units and has had somewhat of an effect with higher efficiency heat exchangers. • More of this is needed desperately; there's a high potential for change. • No, this does not push the industry.
Changes in federal building codes and regulations	1 2 3 4 5	1 2 1 -- --	• It's needed desperately, but not a factor.
Improvements made in energy-efficient products	1 2 3 4 5	2 2 -- -- --	• Can not translate into actual change in the market. • Has no effect on sales because every manufacturer had to do it by law and it leveled the playing field. • Has no effect because the customer usually doesn't "see" the improvements.

5.3.4 Perceptions of HVAC Distributors and Vendors

All of the HVAC distributors and vendors interviewed in this study stated that awareness of, and interest in, energy-efficient HVAC equipment has increased over the past few years and they anticipate it will continue to increase. These respondents offered several explanations for this increase, as the following comments illustrate.

- *"Awareness has gone up since distributors began carrying more models; more models have become available in the last few years."*
- *"The manufacturers push them because the profits are higher on the higher efficiency units, and that's the direction the market is going."*
- *"Efficiency is one of the things you talk about. It's a marketing tool. But that doesn't*
- *"The manufacturers whose products they sell only recently began offering high efficiency models, so it's going to take some time for awareness to grow."*
- *"Only for the last two years has our manufacturer offered a full line of standard and a full line of high-efficiency equipment. Before that, we didn't always have two models available. That's pretty much true with all the big manufacturers."*

HVAC distributors and vendors believe that customer acceptance of and confidence in high-efficiency HVAC equipment has increased over time, especially "as they get more experienced with the products." Although some respondents state that they are "still getting familiar with all of the models," they believe that their sales are based on customer confidence in the products. Most distributors believe that sales and promotion of high efficiency equipment is a factor in market success, but some distributors (and many vendors) appear to hold a "supplier" or "order taker's" view, rather than an aggressive, pro-active, "marketers" view, as the following comments imply.

- *"I don't sell [high efficiency HVAC units] per se. I deal with the contractor, he's the one who makes the sales. All we do is supply what [the contractor] need[s]."*
- *"We operate from the standpoint that the customer should always try to up-sell in regards to efficiency. They should talk to their dealers about this."*
- *"We offer high efficiency units, and we try to teach our contractors the value of selling those products, but we don't deal with the general public."*
- *"People just buy what they can get. There are no efficient choices for commercial."*

- *"We would like to sell more - they have higher margins, but we send out what gets*

Most of the distributors and vendors believe that the relative price differences between standard and energy-efficient HVAC equipment have decreased, and most feel that this trend will continue,

higher SEER units attractive to most small- to medium-sized businesses. None report delays in obtaining energy-efficient equipment, and feel that delivery times for standard efficiency and high efficiency equipment are comparable.

Most distributors and vendors have found that end-user demand for, acceptance of, and satisfaction with energy-efficient HVAC equipment has increased, and most believe it will continue to increase slightly, as the following comments illustrate.

- *"The 'big guys' are looking into it more but more information is needed at the end-user*
- *"The demand is there, but the choices are not there."*
- *"We've been watching this for a while. Ever since the rebates we've had people calling us [regarding efficient HVAC equipment]."*
- *"Everyone is very interested in the efficient models. Whether they buy them, that's*
- *"Demand is high, especially for schools, large commercial contracts, government*
- *"In comparison [to standard units], demand is still pretty low. I'm not going to say we*
- *"Demand is still low; awareness is high only among the larger customers."*
- *"Demand has gone up over the last 3 or 4 years or so, as a result of the rebates."*
- *"Satisfaction is quite high, I haven't had any problems yet."*

As the following table illustrates, HVAC distributors and vendors do not believe that any of the factors included in the survey have a significant effect on the market for high efficiency HVAC

equipment. HVAC distributors and vendors tend to believe that the creation and expansion of utility rebate programs and educational/informational programs sponsored by utilities have been somewhat influential factors in increasing adoption of energy-efficient HVAC equipment. However, the remaining factors, (including changes in state, local or Federal building codes, improvements in energy-efficient products, environmental concerns of commercial and industrial customers, rising energy prices, reduction in the prices of energy-efficient equipment or even manufacturers' own efforts to market high efficiency HVAC systems) will significantly affect the market for energy-efficient HVAC products.

The ratings on the following table were based on a 1 to 5 point scale, in which respondents were asked to utilize a score of 1 if they thought the factor was of "no influence" and a score of 5 for a factor that had "a great deal of influence" on the market for energy-efficient HVAC equipment. Again, it is important to note that the sample sizes for this segment are relatively small, and that these ratings should be treated as qualitative data.

Table 5.5: Influence of Barriers to Adoption of HVAC: Perceptions of HVAC Distributors and Vendors (N=20)

Theoretical Factor	Rating	Number of Responses	Explanation Given by Respondent
Creation and expansion of utility conservation or demand side management programs that offer rebates or other financial incentives	1 2 3 4 5 DK	2 3 6 3 5 1	• Rebates probably have been a serious factor. It allows you to sell a higher-cost unit at the same price as the standard product. • Rebates had an effect on the residential side, but not the commercial side. • They have been somewhat effective. Not a lot of people have been made aware of the rebates. • Rebates solved the problem of lack of incentive for end-user.
Utility educational / informational programs	1 2 3 4 5 DK	4 5 6 -- 1 4	• The good news is that now everybody's aware of it. The bad news is that [awareness] is not the problem. Demand is. • There is always a ripple effect. Just them telling the public seems to have an effect. • They have not been effective at conveying the bottom-line incentive of efficient equipment. • I've not seen any evidence of a real effect here. They haven't hit the end-user.
Your own efforts to market energy-efficient systems	1 2 3 4 5 DK	5 8 3 -- 1 3	• We don't really do any marketing. • We do very little marketing; contractors do not care about selling efficient equipment anyway. • We only market to big customers. We don't get a chance to do a presentation to the owner of some small retail builder.

Table 5.5 Influence of Barriers to Adoption of Energy Efficient HVAC: Perceptions of HVAC Distributors and Vendors (continued) (N=20)

Theoretical Factor	Rating	Number of Responses	Explanation Given by Respondent
Reductions in the prices of energy-efficient products	1 2 3 4 5 DK	4 9 3 2 -- 2	• Prices have not fallen; there have been no major reductions -- not enough to bolster demand • It makes higher SEER more feasible for a wider variety of customers. • It gets people's attention when the bottom line looks good. • There have only been small reductions. • We haven't seen a drop in price since we started selling.
Rising energy prices	1 2 3 4 5 DK	10 3 3 1 -- 3	• This could have an have an effect on the demand for efficient models. • Not a factor people think about - there is no impending energy crunch. • It's not a factor. Building owners are not the ones who are paying the utilities. • Not an issue.
Environmental concerns of commercial and industrial customers	1 2 3 4 5	9 5 3 3 --	• You get your occasional company that cares, but not a predominant theme. • Maybe it's an issue with larger customers, or schools or municipalities. Your average commercial person, they don't care. • It is not an issue of compliance, this is very seldom an issue for any customer of any size.

Table 5.5 Influence of Barriers to Adoption of Energy Efficient HVAC: Perceptions of HVAC Distributors and Vendors (continued) (N=20)

Theoretical Factor	Rating	Number of Responses	Explanation Given by Respondent
Changes in state and local building codes/reg.	1 2 3 4 5 DK	9 5 2 1 -- 3	• State and local codes don't drive the manufacturers to create new models. • Only from a mandated minimum standpoint. • No code requires higher than an 80% efficient unit. • This has no effect, this hasn't been an issue since the first requirements came out a few years back. • Not aware of any stringent building code that requires high SEER units. • Only years ago when the minimum became 10 SEER on 5-ton and under. There has been no real update in efficiency requirements for a while.
Changes in federal building codes and regulations	1 2 3 4 5 DK	10 4 1 2 -- 3	• Has had no effect.
Improvements made in energy-efficient products	1 2 3 4 5 DK	6 5 3 3 1 2	• Nothing has changed on the commercial side in the last few years. • There may be more energy savings but I cannot translate it into actual change in the market. • Has an effect, but only with national account-type customers who are interested in life cycle cost of the equipment. • There's no magic, the metrics of air conditioning haven't changed. Its just 2 coils, a fan, and a pump.

5.4 FACTORS THAT INFLUENCE THE EQUIPMENT SELECTION DECISION

In order to understand the relative effects of the CTAC program on the equipment, respondents were asked two sets of questions. First, respondents were asked to rate the influence each of the following factors on the ultimate end-users' lighting or HVAC equipment selection decision.

- Availability of impartial/objective information
- Availability of credible/reliable information
- Availability of information that is convenient to obtain
- Availability of information at a low cost
- Availability of comparable technology choices with similar costs
- Customer's knowledge/sophistication in comparing technology choices

Respondents were asked to rate the influence of each of these factors using a 1 to 5 point scale in which a rating of 1 corresponds to "the factor is of no influence on end-users' equipment selection decision," and a rating of 5 corresponds to "the factor has a great deal of influence on

Respondents were then asked to discuss possible ways in which lighting or HVAC end-users "learn" about energy-efficient equipment options. Respondents were asked to list what they thought were the five most frequent sources of information used by the majority of lighting or HVAC end-users to learn more about energy-efficient equipment options. They were also asked if they are aware of seminars or workshops designed to assist equipment end-users, specifiers, or installers to learn more about energy-efficient lighting equipment. Finally, respondents were queried about seminar or workshop sponsorship, their participation, and opinion about the influence of seminars and workshops on the end-users' lighting or HVAC equipment selection process.

This portion of the report summarizes the manufacturers', distributors', and vendors' responses to this set of questions. Again, the reader is cautioned that this data is of a qualitative nature and, although the findings are descriptive, they are not statistically applicable to the greater population.

5.4.1 Influential Factors Identified by Lighting Manufacturers

As the following table indicates, lighting manufacturers rate customer's knowledge and sophistication in comparing technology choices, as well as the availability of credible, reliable and impartial objective information as relatively influential factors in end-users' ultimate decision to select lighting equipment.

Table 5.6: Factors that Influence End-User Purchase Decision: Perceptions of Lighting Manufacturers

(N=4)	Rating	Number of Respondents
Customer's knowledge/sophistication in comparing technology choices	1	--
	2	--
	3	--
	4	2
	5	2
Availability of credible/reliable information	1	--
	2	--
	3	3
	4	1
	5	--
Availability of impartial/objective information	1	--
	2	1
	3	1
	4	2
	5	--
Availability of comparable technology choices with similar costs	1	--
	2	2
	3	--
	4	1
	5	1
Availability of information that is convenient to obtain	1	--
	2	1
	3	1
	4	1
	5	1
Availability of information at a low cost	1	1
	2	1
	3	1
	4	1
	5	--

When asked to discuss possible ways in which end-users "learn" about energy-efficient lighting equipment options, lighting manufacturers responded as follows:

- Mailers from utility companies are the most credible and widely-accepted information

source. In particular, "if the utility companies were to endorse a selection of products, then that would probably cut a lot of the busywork out of investigating all the products, and serve to grease the wheels of the whole market [for efficient lighting equipment]."

- Seminars and workshops do have some effect on the eventual end-users' equipment selection decisions. There are many useful ways to get the information out to the end-users, and no one source is going to be the answer for everybody. Information from a wide variety of sources will be useful to different end-users.

- The most frequently used source of information regarding energy-efficient lighting options are the contractors, engineers, architects, and designers that the end-users come into contact with.

- Seminars and similar programs for educating end-users, installers, and others who work in the area of lighting are offered by several large manufacturers as well as by Edison. Education through demonstrations and workshops are very effective, and "can have a substantial impact on end-user equipment selection decisions."

- One respondent shared that his company has recently opened a Lighting Center which showcases products in realistic environments. Like CTAC, it has a meeting space for workshops to educate customers about lighting options. He stated that the company hopes to expand on this idea, and open up Lighting Centers throughout the country.

5.4.2 Influential Factors Identified by Lighting Distributors and Vendors

The following table shows that lighting distributors and vendors rate the availability of comparable technology choices with similar costs, and customer's knowledge and sophistication in comparing technology choices as relatively influential factors on the ultimate end-users' lighting equipment selection decisions. The availability of credible/reliable and impartial objective information are rated by lighting distributors and vendors as having less influence on the lighting equipment purchase decision.

Table 5.7: Factors that Influence End-User Purchase Decision: Perceptions of Lighting Distributors and Vendors

(N=20)	Rating	Number of Respondents
Customer's knowledge/sophistication in comparing technology choices	1	--
	2	2
	3	5
	4	8
	5	5
Availability of credible/reliable information	1	3
	2	5
	3	3
	4	8
	5	1
Availability of impartial/objective information	1	3
	2	2
	3	9
	4	5
	5	1
Availability of comparable technology choices with similar costs	1	2
	2	3
	3	8
	4	7
	5	--
Availability of information that is convenient to obtain	1	1
	2	5
	3	3
	4	9
	5	2
Availability of information at a low cost	1	10
	2	7
	3	2
	4	1
	5	--

When asked to discuss possible ways in which end-users "learn" about energy-efficient lighting equipment options, lighting distributors and vendors responded as follows.

- Distributors are very well aware of the fact that the most frequent information source for

customers regarding energy-efficient lighting options are the manufacturer's representatives and the distributors themselves.

- Distributors believe that in addition to their own companies as sources of information, utility programs, magazines and trade journals that pertain to the lighting distribution industry are important sources of information about efficient lighting equipment.

- Vendors often state that the most frequent information source for customers regarding energy-efficient lighting options is from contractors, and many believe that it is the contractor's responsibility to educate and promote efficient lighting. However, several respondents pointed out that contractors often "do not care about efficiency levels, only about bidding out at the lowest price in order to win the job."

- One respondent summarized by stating that the most frequent information sources for customers regarding energy-efficient lighting options are: 1) lighting distributors, 2) manufacturer's literature, 3) utility programs, 4) in-house engineering staff, and 5) newspaper ads. Another respondent summarized in ordering what he thought were the most useful source of information regarding energy-efficient lighting options as: 1) distributors, 2) manufacturers, 3) trade magazines, and 4) the utilities. Another respondent summarized them as: 1) TV ads, 2) Edison pamphlets, and 3) newspaper articles.

- The manufacturers' seminars are mentioned by distributors and vendors, and many respondents report that they "do an excellent job laying out their products." GE, Philips, Lathonia, and Sylvania were noted in this regard.

    - One respondent stated that he feels that these are mainly conducted simply to familiarize the distributors with the manufacturers' product lines and commented "That's where I've gotten the majority of my information regarding energy-efficient lighting products from."

    - Another respondent stated that he has participated in the manufacturers' seminars, but rated the seminars' influence on end-user equipment selection decisions as a 2 or 3 out of 5.

    - Another respondent has attended CTAC as well as other manufacturers' seminars, and thought they were both helpful in influencing end-users' decisions. However, this respondent pointed out that the degree of influence "depends on exactly who

    - One respondent gave particular praise to Lathonia's seminars, because they were

structured in two separate meeting groups: one for contractors, one for end-users. He rated these seminars' influence on end-user equipment selection decisions as a 4 out of 5.

- One respondent pointed out that the manufacturers' reps have computer programs that give them a before and after comparison, and thought that this service was especially useful to end-users' decision-making.

- CTAC seminars were mentioned by several respondents, and the qualitative data suggests that many distributors and vendors have either heard of or attended CTAC seminars.
  - Those who have participated in CTAC seminars made comments such as "they do
  - A few respondents rated the CTAC seminars' influence on end-user equipment selection decisions as a 4 or 5 out of 5. As one respondent stated, *"you've got to understand the equipment first. Then you can make a decision on what is best for your company."*
  - One respondent, who had attended only CTAC seminars and not any other manufacturer seminar, stated that he felt the CTAC seminars and workshops have a large effect on end-users' equipment selection decisions, but warned that the subjects of the seminars should be kept broad enough to attract a large audience. This respondent stated, *"anything that shows the end-user a way to save money using new technology is going to be a winner."*
  - An additional respondent who had participated in programs at CTAC stated that he thinks if you could take CTAC on the road to different locations, *"it would have a greater influence on the general public."*

5.4.3 Influential Factors Identified by HVAC Manufacturers

As the following table suggests, HVAC manufacturers rate the availability of information that is convenient to obtain, customers knowledge and sophistication in comparing technology choices, and the availability of credible and reliable information as highly influential on the ultimate end-users' HVAC equipment selection decisions. Availability of comparable technology choices with similar costs as well as the availability of low cost, impartial and objective information are perceived to be somewhat influential factors in end-users' HVAC equipment selection decisions.

Table 5.8: Factors that Influence End-User Purchase Decision: Perceptions of HVAC Manufacturers

(N=4)	Rating	Number of Respondents
Customer's knowledge/sophistication in comparing technology choices	1	--
	2	--
	3	1
	4	2
	5	1
Availability of credible/reliable information	1	--
	2	1
	3	--
	4	3
	5	--
Availability of impartial/objective information	1	--
	2	1
	3	2
	4	1
	5	--
Availability of comparable technology choices with similar costs	1	--
	2	1
	3	2
	4	1
	5	--
Availability of information that is convenient to obtain	1	--
	2	--
	3	1
	4	--
	5	3
Availability of information at a low cost	1	1
	2	--
	3	3
	4	--
	5	--

When asked to discuss possible ways in which end-users "learn" about energy-efficient lighting equipment options, HVAC manufacturers responded as follows:

- One HVAC manufacturer stated that he feels that the majority of his customers receive

information regarding energy-efficient HVAC equipment from advertisements, although he does not feel that advertising in the HVAC industry is driving anybody's decisions. He stated, *"I think [information is spread] more at the level of communication between distribution forces - sales engineers, unitary distributors, design contractors and engineers."* This manufacturer was not certain about the value of seminars/workshops; he said, *"I'm a member of the association of Energy Engineers and so I see all kinds of fliers of different programs like this. I know that people see it, but I don't know that it's having any effect on how people go buy stuff. The bottom line in customer demand often comes down to relationships and applications. 'Whose stuff is going to do what I need it to do,' and 'which contractor am I friends with', and 'which engineer knows my sales*

- One HVAC manufacturer feels that the majority of his customers receive information regarding energy-efficient HVAC equipment from trade magazines or a contractor/architect/engineer. He feels that the distributors and manufacturers need to educate more at the contractor/architect/engineer level. He mentioned a possible problem with information at the distributor level is that the manufacturer only sends information to the main office of a distributor, not each branch, so it is their responsibility to circulate that information to the branch offices which he feels many times does not get done.

- One HVAC manufacturer stated that the majority of end-users receive information regarding energy-efficient HVAC equipment from: 1) trade publications, 2) seminars (local ASHRE chapters), 3) manufacturers reps, and 4) trade shows. ASHRE and the World Energy Conference put on seminars which this manufacturer assessed as having a direct effect on the end-user's equipment selection decisions because they introduce the end-user to all of the possible options," and he rated the seminar influence on end-user decisions as a 4 out of 5.

- An HVAC manufacturer stated that he was aware of seminars sponsored by manufacturers for distributors and contractors. His company puts on seminars, and his sales representatives attend workshops put on by the utilities. He found these seminars to be very effective, and stated that, "t*he people who attend the seminars pass on their knowledge to their associates, their company, the contractors, and the information eventually passes on to the end-users."*

- One of the HVAC manufacturers stated that the best way to expand the market for efficient electric equipment is for the manufacturers to team up with the utilities and the contractors to work together as a team to promote efficient products.

5.4.4 Influential Factors Identified by HVAC Distributors and Vendors

As the following table suggests, HVAC distributors and vendors rate the availability of information that is convenient to obtain, and the customers' knowledge and sophistication in comparing technology choices as somewhat influential factors on the ultimate end-users' HVAC equipment selection decisions. The availability of credible and reliable information are perceived by HVAC distributors and vendors to be less influential factors. A few distributors and vendors rated the availability of comparable technology choices with similar costs as a relatively important factor, others thought it was a less influential or even inconsequential factor.

Table 5.9: Factors that Influence End-User Purchase Decision: Perceptions of HVAC Distributors and Vendors

(N=20)	Rating	Number of Respondents
Customer's knowledge/sophistication in comparing technology choices	1	2
	2	3
	3	3
	4	8
	5	4
Availability of credible/reliable information	1	--
	2	6
	3	7
	4	4
	5	2
	DK	1
Availability of impartial/objective information	1	2
	2	8
	3	5
	4	1
	5	3
	DK	1
Availability of comparable technology choices with similar costs	1	3
	2	6
	3	3
	4	4
	5	4
Availability of information that is convenient to obtain	1	1
	2	1
	3	7
	4	5
	5	5
	DK	1
Availability of information at a low cost	1	3
	2	9
	3	5
	4	1
	5	1
	DK	1

When asked to discuss possible ways in which end-users "learn" about energy-efficient lighting

equipment options, HVAC distributors and vendors responded as follows:

- Typically, HVAC vendors and distributors state that their customers most frequently receive information regarding energy-efficient HVAC equipment from their contractor, but are often concerned that the contractor themselves are generally too busy trying to compete with one another to push the more efficient units. As one respondent stated, *"I would admit that contractors have to be trained to try sell the higher SEER stuff instead of going in there to be the lowest bidder. It depends on the size of the contractor, but they are just trying to stay in business."* Another respondent had a similar view: *"You gotta hit the end-user, because the contractor doesn't care. He can make more money by being the cheapest than he can by being the most efficient guy on the block."*

- HVAC vendors are frequently not aware of any seminars or workshops that are available to teach people more about energy-efficient HVAC equipment, and as one stated, *"I don't have the money to afford those kinds of things anyways."*

- Distributors generally believe that customers often receive information regarding energy-efficient HVAC equipment from advertisements, but generally believe that advertising in the HVAC industry is not "driving anybody's decisions." As one distributor stated, *think [information is spread] more at the level of communication between distribution forces - sales engineers, unitary distributors, design contractors and engineers."*

- Several HVAC vendors stated that they are not aware of any seminars or workshops that are available besides those sponsored by their own companies. Some mentioned that although they are not currently selling high efficiency models, additional seminars would help them sell the efficient HVAC units in the long run.

- One respondent stated that the majority of his customers receive information regarding energy-efficient HVAC equipment from utilities and from advertisements in industry trade magazines in the customers' trades, such as *Restaurant News*. He feels there is plenty of information out there, *"but much of it does not do much good because it never reaches the end-user. That is why rebates are so important - they target the end-user."* This distributor went on to explain, *"I have the information. I have the payback computer programs, and all kinds of software that will analyze how the customer can afford the equipment, or if they have to finance it. I show the contractor and most of them don't care until the owner ASKS THEM for it."*

- Several HVAC vendors were aware of CTAC seminars. One respondent who has attended them, gave them a rating of 3 out of 5 in terms of influencing customer equipment selection decisions, and commented that, *"the seminars are very well done and informative but the benefits are difficult to measure aside from general awareness benefits."*

5.5 SUGGESTIONS FOR EXPANDING THE MARKET AND INCREASING THE DEMAND FOR ENERGY-EFFICIENT EQUIPMENT

At the close of the interviews, respondents were asked to sum up what they think can be done to expand the market and increase user demand for energy-efficient lighting or HVAC equipment. In general, respondents reiterated various points that they had made previously throughout the interview, but it is interesting to note those factors which were mentioned again or emphasized. This final section of this report summarizes the responses to this series of questions.

5.5.1 Suggestions Offered by Lighting Manufacturers

- Lighting manufacturers tend to think that they need to "keep hammering away at the end-users," and mentioned various incentive programs some have developed that are designed to encourage key distributors to sell more efficient lighting products. Some mentioned sponsoring programs that give rewards to distributors who get more end-users to attend their seminars.

- Typically, these respondents believe that the best way to expand the market for efficient lighting equipment is to raise awareness at the end-user decision-maker level using educational tools and/or incentives to help contractors, distributors, engineers, and designers sell the efficient equipment more effectively.

5.5.2 Suggestions Offered by Lighting Distributors and Vendors

- Some distributors and vendors feel that the best way to expand the market for efficient electric equipment is through more advertising, while others believe one-on-one contact is more productive.

    - *"Once I get 10 minutes with a customer out at the counter, and can just hit him with everything I've got, and try to keep it simple, they all find it very interesting. Some pursue it, some don't, but you've got to get the message across."*

- *"More mail in the customer's mailbox, more TV commercials. Somebody at the utility has got to come up with something real catchy, that's going to catch everyone's eye, and make them look for a few seconds. That's the job of the*

- One respondent stated that the best way to expand the market for efficient electric equipment is through a reduction in the cost of efficient equipment in order to push end-users "over the edge" to selecting efficient equipment. This respondent commented that, *right now the payback times are slightly too long for many and if they could be reduced, even marginally, through rebates, manufacturer price cuts, or any other means, many more people would choose the efficient lighting."*

- Along a similar line, another respondent stated that, *"light bulbs are a commodity in everybody's minds. Efficient light bulbs are an investment. Attacking that perception is the key to increasing customer demand."* This can be accomplished by an effort on behalf of manufacturers and utilities. They must approach the customer continuously from different angles, and with different media. *"Finally, you'll get people to start thinking about it and asking questions about it, and it all begins to sink in."*

- One respondent felt that the best way to expand the market for efficient electric equipment is through utility programs which would give companies a break on their rates, and commented, *"if the utility were to say 'hey, if you do certain things in your business to become more efficient we'll give you a break on your rates' that would do a lot to increase demand. Why would a guy go through his business and make changes if he can't*

- Another respondent felt that the best way to expand the market for efficient electric equipment is through regulation which outlaws non-efficient equipment for certain commercial and industrial applications, and stated, *"For me, I feel pretty helpless in the whole [efficient lighting promotion] picture. It's up to the government to step up and make some [lighting efficiency] standards."*

- Several respondents commented that the best way to expand the market for efficient electric equipment is through targeting contractors, as well as creating demand by targeting the decision-makers within companies who will create the budgets for the contractors to work within. As one respondent stated, *"The most important thing is that the information has to be directed to the right individual."*

- Several respondents reiterated much of what had been stated earlier about the CTAC program.

- One commented that the best way to expand the market for efficient electric equipment is through a joint effort. *"If Edison were to combine forces with the lamp manufacturers and the lighting equipment companies, and come up with a training seminar and take it on the road doing on-sites at major plant engineering companies, property management companies, engineering firms, and contractors, they could really get some education out there. Take CTAC on the road!"*

- Another respondent felt that the best way to expand the market for efficient electric equipment is to "*keep pounding away with education*." He recommended initiating a program wherein SCE representatives put on CTAC seminars "in-house" at major distributors and contractors. This would eliminate the high "opportunity cost" of attending a seminar, and get the message of efficient lighting across to a wide variety of people. To increase demand for this equipment, the respondent recommended that CTAC consider joint sponsorship with groups like BOMA.

- Several respondents commented that the best way to expand the market for efficient electric equipment is a continuation of "even the smallest of rebates."

  - *"Even the smaller perks help. The informed people are going to push through the budget on an efficient retrofit no matter what. But the less informed ones need some grease on their palms. Last year I sold two huge building retrofits based solely on the $15 rebate per exit sign."*

  - *"Rebates are necessary not to convince the facilities people at a company to do a retrofit, but to convince the decision-makers, the owners and VPs.* T*he people at a company who push for the retrofit, they do it for the right reasons. The people who approve, and pay for, the retrofit, they do it for the rebates."*

5.5.3 Suggestions Offered by HVAC Manufacturers

- Most HVAC manufacturers believe that the best way to expand the market for efficient electric equipment is to focus on the bottom line costs and the advantages of high efficiency HVAC systems.

  - *"If you really want to get somebody to do something, you've got to hit 'em at the bottom line. You know, if you tax the hell out of R-11, people stop buying it. There's always going to be an increment above minimum that people aren't going to want to pay for. Cost is king."*

  - *"The end-user on the commercial side is more concerned about his bottom line than his utility bill. You've got to find a way around that. The best way is to*

regulate them."

- On the demand-side, some HVAC manufacturers are interested in developing more creative programs, such as performance contracting, to offset customer fears over the initial investment.

  - *"We supply equipment to a lot of performance contractors, and several of those are tied into the utilities. We feel there will be more and more of that in the future."*

  - A related suggestion was that the utility could send customized monetary savings information to company facility staff packaged in with company utility bills. The utility could base this on the company's current usage, and give them several options in terms of efficiency levels.

- One HVAC manufacturer suggested that there should be more research on the part of the manufacturers with regard to more efficient motors.

5.4.4 Suggestions Offered by HVAC Distributors and Vendors

- One HVAC vendor stated that the best way to expand the market for efficient electric equipment is to educate the contractor for the retrofit market, or the architect/engineer for the new construction market. He would like to see the utility, along with distributors, improve the understanding of the contractors, engineers, and architects of how to translate high efficiency into a dollars benefit for the end-user. He feels this could be done through training programs.

- One HVAC distributor stated that he felt the best way to expand the market for efficient electric equipment is to pressure manufacturers to "get on the ball" and begin producing the full range of energy-efficient HVAC units. When asked if he would consider changing manufacturer affiliation based upon this lack of availability, the respondent stated that his company is but a branch of a large corporation, and that the decisions are made at the corporate level. He feels like his "hands are tied," because he would like to begin selling the higher SEER units to make more profit and keep some of his larger commercial and municipal customers, but until the product is made available, he will just have to wait.

- One respondent felt that the best way to expand the market for efficient electric equipment is to help the end-users overcome their fears about the up-front investment by offering financing or performance contracting/guaranteed savings arrangements. He also suggested that somebody needs to train the contractors to sell the higher SEER units.

- Several respondents commented that the best way to expand the market for efficient electric equipment is to bring back the rebate programs, because they believe these are critical in reaching the end-user or the "guy who is paying the utility bill." He stated, *there is a rebate program, and you attack the owners too, maybe they will specify efficient equipment more often."*

- One respondent commented that the large national chains should "be hammered the hardest," because their stability and longevity within one building makes them targets for high efficiency HVAC. *"Those guys are in it for the long term. They're going to live with the equipment as far as they can see into the future. They're not planning on bailing on the building, they open a building because they plan on making a profit."*

- One respondent felt that the best way to expand the market for efficient electric equipment is for the manufacturers to offer efficient models for commercial customers. He sells efficient equipment for residential, but does not have any "high efficiency" models to sell to his commercial customers. He stated that, *"in my area, people are very conscious of the value of a dollar. Therefore, they are very resistant to buying anything over the minimum efficiency level. That's why I think that Edison has to offer rebates, or get together with the manufacturers to bring down the cost of higher efficiency equipment, or bring down the cost of the customers' power ½ cent per kWh as an incentive."*