Customer Energy Efficiency Program
Measurement and Evaluation Program

PACIFIC GAS & ELECTRIC COMPANY'S 1998 Food Service Technology Center Market Effects Study

STUDY ID: 420MS-D

June 30, 1999

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

All inquiries should be directed to:

Lisa K. Lieu
Revenue Requirements
Pacific Gas and Electric Company
P. O. Box 770000, Mail Code B9A
San Francisco, CA 94177

Equipoise Consulting, Inc.

Energy Analysis

Project Management

Training

Final Report for

Pacific Gas & Electric's 1998 Food Service Technology Center Market Effects Study

Submitted by:

Equipoise Consulting Incorporated

in association with

Ridge & Associates,
Energy Solutions, and
RJ Research

June 16, 1999

Equipoise Consulting Incorporated is committed to environmentally friendly practices in the workplace. We use recycled paper in all our proposals and reports. We print double sided and use electronic faxes when possible to decrease paper use. All our office paper is recycled. Our 'virtual' office arrangement means that work between colleagues is performed by telecommuting, thereby minimizing transportation requirements.

Acknowledgments

This evaluation could not have been accomplished without significant contributions from many people. The evaluation team would like to express its gratitude in particular to the staff of the FSTC and the FSTC Advisory Board. The FSTC staff were openly helpful in supplying information and identifying contacts. Often it was their ability to supply the background and title of the individuals that made it possible to assemble many of the sample lists. The FSTC Advisory Board was both generous with their time and, we believe, truly open to supplying all information, as best they knew it, to support the evaluation. Many of them supplied the critical information needed for the initial market characterization that formed the basis for the evaluation. At the end of the project they supplied frank and honest feedback on the draft findings, and participated in focus groups to try to settle final unresolved issues. On a more general plane, the evaluation team would like to thank the designers, manufacturers, and end users that were willing to participate in data collection efforts during their busy working days. It is irrefutable that without their help this evaluation would not have been possible. Last but not least, the evaluation team would like to thank the evaluation project manager, Valerie Richardson, for her support and confidence during the project.

Equipoise Consulting Incorporated, would like to recognize and thank its subcontractors on this evaluation. Ridge and Associates supplied core analysis planning, analysis, and writing throughout the project. Cini-Little International supplied foodservice industry insider perspective for the team, Energy Solutions assisted in engineering interviews and interview data analysis, and RJ Research conducted essential telephone survey and focus group data collection. In-Her-Own Write edited the draft and final reports.

TABLE OF CONTENTS

Section 6 Conclusions and Recommendations

Appendices

TABLE OF EXHIBITS

Page

Section 1
Executive Summary

1.1 Program Summary

The Pacific Gas & Electric (PG&E) Food Service Technology Center (FSTC) was established in 1986. A 1986 focus group, later to become a standing Advisory Board, recommended broadening the FSTC's focus to a national level in order to effect energy efficiency practices. Shortly thereafter, the FSTC began efforts to develop test methods for acceptance by the American Society of Testing and Materials (ASTM), the national testing standardization organization. Since that time, the FSTC program has steadily continued to develop test procedures on a progressively expanding list of foodservice equipment. As of the beginning of 1999, the ASTM had approved seventeen test procedures, five procedures were being considered for approval, and another ten are planned or under development. The FSTC has developed all of the foodservice test methods currently approved by the ASTM.

While the majority of its effort prior to 1995 focused on commercial cooking appliances, efforts since that time have expanded to include kitchen ventilation, refrigeration, and sanitation appliances, as well as creating a program to assist customers in whole facility energy efficiency needs (i.e., shell, lighting and HVAC). As part of this expanded effort, the FSTC started working more closely with the American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE) on ventilation requirements in foodservice facilities.

Outreach to disseminate information on nonresidential kitchen efficiency has been a part of the FSTC effort since the late 1980s. This has been accomplished primarily via training sessions, technical report distribution, and long-term promotion of a trade magazine addressing energy efficiency issues.

1.2 Study Summary

The evaluation project had four core goals: characterizing the market, assessing market effects, forecasting future effects, and making recommendations.

To accomplish these goals, the evaluation approach incorporated the following key elements:

- A market characterization based on in-depth interviews of selected Key Market Actors. These Key Market Actors were chosen based on their knowledge of the industry and their market actor type.
- The market characterization was used to inform the research plan.

- Based on the research plan, data was collected from 11 foodservice designers, 31 equipment manufacturers, a census of end user FSTC participants over the past two years (36), and 100 California end user nonparticipants.
- The designer and manufacturer interviews underwent qualitative analysis, while the participant/nonparticipant telephone surveys were analyzed statistically.
- The findings were reviewed by two focus groups comprised of Advisory Board members to address key unresolved issues.
- The quantitative and qualitative analysis findings were integrated in order to draw the overall conclusions presented in this final report.

Details of the approach and analysis techniques are presented in Section 4, Methodology.

1.2.1 Market Characterization

The market segment being studied is the California commercial kitchen efficiency market. Geographically, it is defined by the borders of the State of California. This market segment has two elements: the food service facility efficiency element (i.e., building, lighting, insulation, window, and HVAC efficiency), and the kitchen equipment efficiency element (i.e., the cooking hood ventilation system, cooking equipment, refrigeration, and sanitation equipment efficiency).

The commercial foodservice equipment market character can best be summarized by the following features:

- The market is composed of a large number of market actors, each type of market actor having a wide range of sizes. The two primary market actors are:
  - Manufacturers - about 200 to 250 manufacturers of energy-consuming equipment, the majority with revenues of less than $5 million/year.
  - End users - about 72,000 commercial and institutional end users in the California market. About 63,500 of these are commercial restaurants split roughly 50%/50% between fast food and sit down.
- The market structure for the foodservice market is extremely complex. It involves many market actors at each market level. In addition, interactions among market actors vary by customer size. These interactions are documented in detail.
- The primary market event of interest is the sale/purchase of a unit of energy-using equipment. There were ~12,000 units of high value equipment sold in California in 1998.
- For a variety of reasons, end users place a low priority on energy efficiency for foodservice providers:
  - Energy costs represent 3% to 5% of operating costs, while labor and material costs are on the order of 30% each.
  - Growth is the primary objective for most foodservice entrepreneurs. Kitchen equipment costs are kept low as part of capital spending minimization.

- Performance, reliability, durability, and cost almost always have a higher priority than energy efficiency in end users' selection criteria. As the size of the end user decreases, price rapidly becomes the most important purchase criterion.

1.2.2 Baseline

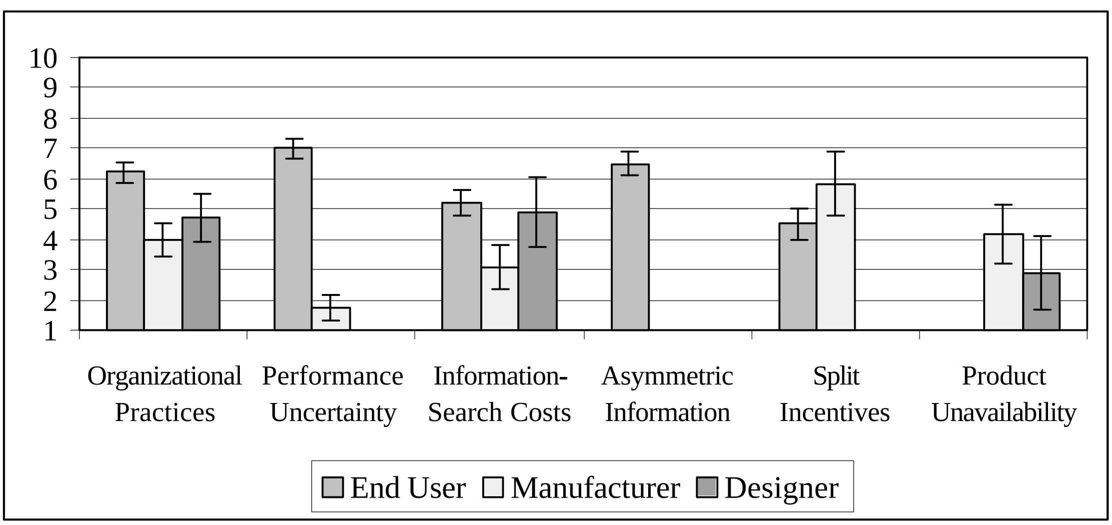
The market characterization completed at the beginning of the study hypothesized the important barriers in the market. This understanding of the market was combined with program design and implementation information to identify the subset of barriers that could possibly be affected by the program. These key market barriers were organizational practices, performance uncertainty, asymmetric information, information and search costs, split incentives, and product unavailability.

While the overall results address many issues, this baseline summary presents only the results of the market barrier analyses (Exhibit 1.1).

Barriers by Market Actor

- Performance uncertainty is the largest barrier for the end users.
- The next highest barrier for end users is asymmetric information, which seems logical, since sales staff may exaggerate the performance claims of the equipment.
- Information and search costs barrier is much lower than performance uncertainty for end users. This is a little surprising since information availability should reduce performance uncertainty. One explanation is that the customer does not find it credible when it is available.

Exhibit 1.1
Barriers for End Users, Manufacturers, and Designers



- The largest barrier, as viewed by the manufacturers, is that of split incentives. The customer who makes the purchase decision is generally not responsible for facility operating costs. As a result, there is no direct incentive to incorporate energy efficient equipment as a route to reducing operating cost.

- Overall, designers do not seem to feel there are barriers to energy efficiency.

Barriers Across Market Actors

A review of Exhibit 1.1 illustrates the following points,

- End users perceive organizational practices as more of a barrier than either designers or manufacturers. This indicates that end users see more organizational obstacles to implementing energy efficiency within <u>their</u> organizations than manufacturers see in the development of efficient equipment or designers see in developing efficiency recommendations.
- There is a big difference in how the manufacturer and end user perceive the performance uncertainty of energy efficient equipment, with end users considering it much more of a barrier. This is logical because the manufacturers are the creators of the information and are more likely to be motivated to make certain that it is correct. Also, manufacturers are less likely to admit they are uncertain of energy efficiency performance. On the contrary, end users are currently reliant on manufacturers for performance information, since standardized information is not widely available.
- Split or misplaced incentives are perceived to be more of a barrier by the manufacturers than the end users. This may be a result of the samples for each group. End users represented a wide range of company size. The manufacturers, however, tend to have direct interactions with large chains, where split incentives are more likely to be present. They most likely based their responses on those direct interactions.

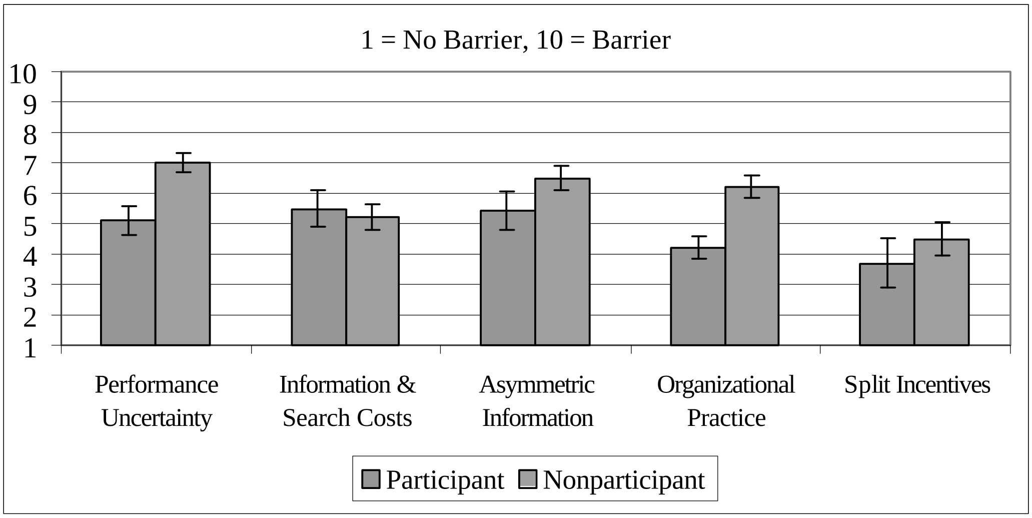
1.2.3 FSTC Market Effects

The market effects that are, to varying degrees, attributable to the FSTC are:

- FSTC has produced some near-term quantifiable effects for participants (i.e., awareness, knowledge, projected purchase decisions, etc.). Statistically significant market barrier effects were identified for performance uncertainty, asymmetric information, and organizational practices (Exhibit 1.2).
- It was not possible to assess market effects for nonparticipants because no prior benchmarks exist.
- FSTC has had weak manufacturer and designer market effects. It should be noted, however, that while not a specific hypothesis, the FSTC has very high market recognition in the manufacturer/designer community. This is an important market effect in itself.
- FSTC is having a major, most likely sustainable, effect on ASTM test procedure development.

- Overall, the FSTC program is addressing virtually all of the crucial communication links and market barriers.

Exhibit 1.2
Participant/Nonparticipant Market Barriers Comparison



1.2.4 Forecasting Market Effects

Diffusion curves were developed to estimate the path toward market potential over time for cooking, refrigeration, and ventilation equipment under the no-label and label scenarios. These results are presented in the body of the report.

1.3 Recommendations

The recommendations discussion is divided into Study Methods, Program Design, and Future Studies and Data Collection Opportunities.

1.3.1 Study Methods

There are two measurement issues for future market effects studies.

1. **Customer Self-Projection of Future Purchase of High Efficiency Equipment**. During the end user surveys, the majority of customers stated they would buy above average efficiency equipment in the future. This finding did not agree with most other indicators of the priority of energy efficiency for the end users. The evaluation team and the FSTC Advisory Board focus groups both feel that the question failed to measure the parameter as well as desired. This is probably because the generally low level of information on the efficiency/performance of equipment does not allow the end user to judge energy use, equipment performance, or extra costs tied to the higher efficiency purchase. Those end users who lacked the basic experience may

have given the socially acceptable answer. In the future, attempts should be made to collect information not only on stated preferences but also on revealed preferences.

2. **Reported Levels of Manufacturer Use of ASTM Test Procedures**. About 50% of the cooking equipment manufacturers reported frequent use of ASTM test procedures. This finding was questionable enough that the evaluation team asked the focus groups to explain the findings. The Advisory Board members did not find the claims credible. Future evaluation efforts should ask more detailed questions in this area to establish actual use patterns.

1.3.2 Program Design

1. **Develop Methods of Increasing Recognition and Use of ASTM Test Results**. One of the findings of the market characterization and the market effects study is that while the FSTC has relatively high name recognition in the industry, the recognition of the ASTM standardized test procedures was low among designers and end users. This is combined with the fact that the market characterization identified weak and moderate communication avenues between the ASTM and the designer/end user communities, but could not identify a major communication channel.

   The evaluation team recommends that the FSTC consider one or both of the following means of promoting recognition/use/acceptance of the ASTM standardized test procedures.

   - Encourage/support a voluntary labeling or standards system in the cooking appliance arena. This relatively direct approach would create a major channel for recognition and use of standardized test procedures. However, to implement this approach, all stakeholders must be convinced of the overall benefits. This may prove difficult given the current politically sensitive climate among some market actors.
   - Bolster outreach efforts to encourage (1) chains to request and/or consider energy efficiency (via the standardized test methods) in their equipment specifications, and (2) manufacturers to use test results in sales efforts. Hopefully this effort will result in a push (demand) on the manufacturers to put more energy efficient equipment in the market. This is a long-term approach and may prove more costly and more difficult to sustain than the previous recommendation. However, the climate for this approach may be less politically sensitive, resulting in better chances of success.

2. **Consider Targeting Small Customers.** The small customers, who represent approximately 47% of the market, appear to be under-served. Lack of awareness of cost-effective efficient equipment is a major issue for this portion of the population. The benefits and costs for addressing the needs of the small customer should be examined.

3. **Develop Methods to Educate Designers on ASTM Test Methods.** The designer interviews reveal that, even though 82% received *Foodservice Equipment reports*,

only 36% of the designers were aware of ASTM test methods. While the majority of the designers interviewed serviced the institutional market, the designer community appears to be an underused resource or channel for communicating the value of ASTM test methods, results, and other energy efficient information. These market actors would seem to have the ability to influence a wide range of clients if they had such information.

Program Tracking Database

The FSTC should invest in the development of a more comprehensive tracking system for all customers, designers, and manufacturers who visit the FSTC, call the FSTC, or visit its Web site. This would allow better targeted and more effective client communications and program evaluations.

1.3.3 Future Studies

Using saturation data over time as a way of measuring the success of market transformation programs requires far too much time if the goal is to provide program designers timely information for modifying their programs to maximize market effects. Given this problem, the measurement of proximate or intermediate indicators, such as customer attitudes and perceptions of market barriers, holds the most promise for informing program designs and measuring program success. It is strongly recommended that much more work be done in the development of scales designed to measure all relevant proximate or intermediate measure of market effects. If valid and reliable scales could be developed for each sector, end use, and market actor, they could be used for the evaluation of all market transformation programs in California, thus allowing more rigorous comparisons across time and programs.

1.3.4 Data Collection Opportunities

If possible, PG&E/FSTC should consider participation in the commercial market share tracking system and the commercial saturation survey that are being managed by the California Energy Commission (CEC). Consideration should be given to requesting that CEC include key foodservice technologies.

Tracking the absolute and marginal saturation of cooking, refrigeration, and ventilation equipment in the commercial foodservice industry is an essential task if one is interested in monitoring the penetration of energy efficient equipment. However, such a task poses unique problems since there is relatively little performance data available for many of these technologies.

Section 2 Introduction

This section presents an overview of the FSTC program, a summary study description, and concludes with a discussion of the report layout and content.

2.1 Description of FSTC Program

The Pacific Gas & Electric Food Service Technology Center (FSTC) project was originally conceived and initiated in 1986. The conceptualization of the original program was done with the assistance of a focus group composed of experts from throughout the foodservice industry. This group evolved into the standing FSTC Advisory Board that meets twice yearly to advise on program direction.

At inception, the program used the PG&E Learning Center kitchen as its test facility. In early 1990, it established its own test development laboratory, then expanded the laboratory and included a demonstration kitchen/classroom and offices in late 1992. In 1998, they expanded the storage facility to include storage for large equipment.

From 1986 to August 1994, PG&E operated the FSTC program and facilities. The effort was directed by Bettie Ferlin Davis during that period. In August 1994, PG&E outsourced the day-to-day operation of the program and the laboratory/training facility to Fisher Nickel Incorporated, who have continued to manage it since that time.

In terms of the program focus, the original focus group in August of 1986 recommended that the FSTC broaden its horizons to a national level. Shortly thereafter, the FSTC began efforts to develop test methods for acceptance at the American Society of Testing and Materials (ASTM), the national testing standardization organization. Since that time, the FSTC program has steadily continued to develop test procedures on a progressively expanding list of foodservice equipment. As of the beginning of 1999, the ASTM had approved 17 test procedures, 5 procedures are being considered for approval, and another 10 are planned or under development. The FSTC has developed all of the foodservice test methods currently approved by the ASTM.

While the majority of its effort prior to 1995 focused on commercial cooking appliances, efforts since that time have expanded to include kitchen ventilation, refrigeration, and sanitation appliances, as well as to create a program to assist customers in whole facility energy efficiency needs (i.e., shell, lighting and HVAC). As part of this effort, the FSTC has expanded its participation in the American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE).

Outreach to disseminate information on commercial kitchen efficiency has been a part of the FSTC effort since the late 1980s. This has been accomplished primarily using the following three modes:

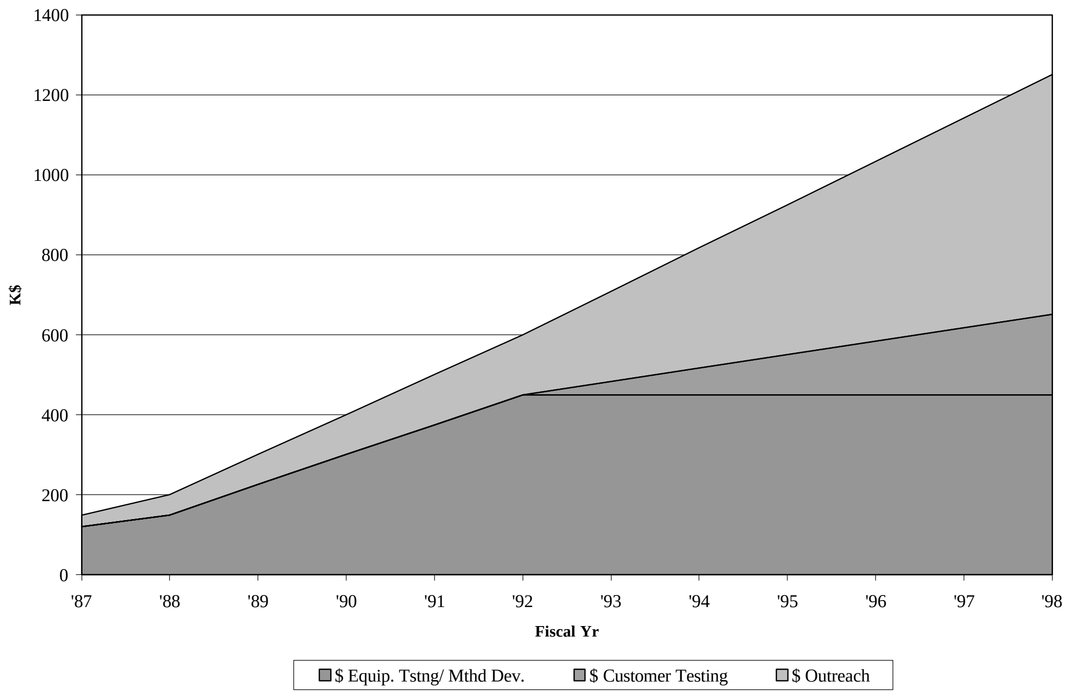
- Training Sessions – Prior to 1996, the majority of the FSTC training and outreach efforts were concentrated on educating PG&E service representatives. To address possible changes in outreach due to deregulation, the FSTC redirected its efforts toward the broader market. The FSTC now performs training and sponsors seminars for targeted audiences in the foodservice arena.
- Distribution of Reports – The FSTC uses its equipment testing and test procedure development reports to promote energy efficiency throughout the industry. In the past, these reports were given to key industry players; they are now supplied free of charge to PG&E customers and are sold to other interested parties.
- Trade Magazine – In 1990, the FSTC began an effort to develop a foodservice industry newsletter to promote energy efficiency in commercial kitchens. The newsletter, entitled *Kitchen Monitor*, was sold by subscription and published by Cahners Publishing until 1994, when it was discontinued. At the time it was removed, the subscription base was ~500. Since that time, two foodservice publishing professionals, previously with Cahners Publishing, started a follow-on magazine to Kitchen Monitor named *Foodservice Equipment reports* (FER). This magazine is distributed free to customers and is supported by advertising revenues. The FSTC has a close working relationship with FER and frequently contributes technical articles on its test results. The current circulation of FER is ~33,000.

The final elements defining the FSTC program to date are its funding levels, funding sources, and expenditures. Almost from the time the FSTC began operations, co-funding was obtained from the Electric Power Research Institute (EPRI) and the Gas Research Institute (GRI). Shortly thereafter, co-funding was secured from the National Restaurant Association (NRA). As exposure expanded, so have the co-funding arrangements. The FSTC currently gets co-funding from EPRI, GRI, NRA, the California Energy Commission (CEC), and the California Board for Energy Efficiency (CBEE), along with funding from manufacturers to pay for tests performed. Co-funding arrangements with Southern California Gas and Enbridge/Consumers Gas are also being finalized at the time this report is written.

In the early years, the FSTC expenditures concentrated on test development. As their information base increased, more effort went into outreach. In 1992, the FSTC began working with manufacturers to perform comparisons between tested equipment. The level of effort dedicated to this type of activity currently represents about 15% to 20% of the overall FSTC effort, with outreach representing approximately 50% of the FSTC expenditure.[1] The estimated overall FSTC spending is shown in Exhibit 2.1.

[1] The expenditure estimates presented here are approximate spending for labor and supplies based on discussions with Don Fisher of the FSTC.

Exhibit 2.1
FSTC Budget Progression - Contract Labor and Supplies



2.2 Description of Study

In 1996, California State Assembly Bill 1890 (AB1890) established a uniform funding mechanism for ratepayer funded energy efficiency programs and charged the California Public Utilities Commission (CPUC) with overseeing the mechanism. Subsequently, the CPUC established the California Board for Energy Efficiency (CBEE) to advise it on how best to provide public purpose energy efficiency programs in California.

In addition, CPUC Decision (D.) 95-12-063 calls for public spending to shift towards activities that will transform the energy market (Eto et al. 1996). Based on the utility performance award mechanisms approved in D. 97-12-103 and updated in Resolution E-3555, adopted July 23, 1998, for the 1998 Energy Efficiency programs, the CBEE has directed PG&E to use Public Goods Charge (PGC) funds to perform Market Baseline and Transformation Studies on the 1998 energy efficiency programs. The present study represents an evaluation covered under that directive. There is currently no regulatory verification plan in place for these studies. PG&E and the CBEE will use the results of these reports, as appropriate, to augment and refine future programs.

The 14 research objectives for this study are listed below:

1. Characterize and describe the market for foodservice technologies by key technology types; quantify relative sales through the various distribution channels.

2. Identify the key market decision-makers and the role of efficiency within their overall decision-making calculus; document the decision-making process, including the priorities and methods used by foodservice industry decision-makers, end users, vendors, and manufacturers.
3. Document changes to date in the foodservice technology market.
4. Present hypothesized market barriers. Building on existing research and current knowledge, further describe and expand on the specific nature of the market barriers faced by each market actor in the foodservice industry.
5. Present hypothesized market effects. Building on existing research and current knowledge, further document the role of the FSTC in the foodservices industry and expand upon the hypothesized market effects that can be attributed to the program.
6. Collect quantitative and qualitative data to test the hypothesized market effects. Focus on both end user and supply-side market actor interviews. Investigate the feasibility of using a control area to test for market effects.
7. Link hypothesized market effects with market barriers.
8. Assess the longevity of market effects.
9. Present hypothesized future market effects. Building on knowledge gained in conducting the study, expand upon the hypothesized potential future market effects attributed to the program.
10. Collect baseline data from which to test hypothesized, potential future market effects.
11. Based on knowledge gained from this study, develop general methods of evaluating market effects that can be attributed to the program.
12. Develop a "forward-looking" assessment of the market potential for the future program administrator.
13. Make recommendations for program improvements.
14. Make recommendations for future studies.

Some of these research objectives overlap and many have several separate elements. The research requirements range from determining the baseline to projecting future market potential and study methods.

To simplify the picture, the project has been conceptualized as having four core goals, encompassing all 14 objectives. Exhibit 2.2 presents the grouping of objectives by goal. This project was planned and completed around these four overarching goals.

Exhibit 2.2
Grouping of Project Objectives

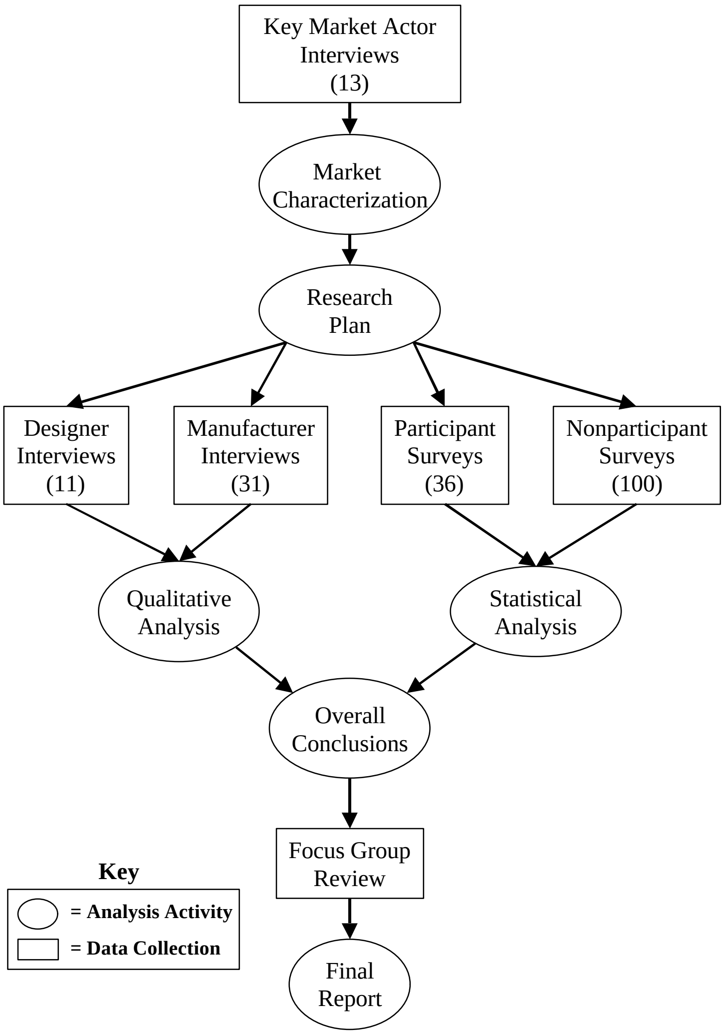
Project Component	**Objectives**
Characterizing the Market	1, 2, 3, 4, 5
Assessing Market Effects	6, 7, 8
Forecasting Future Effects	9, 10, 12
Making Recommendations	11, 13, 14

To accomplish these goals, the evaluation approach illustrated in Exhibit 2.3 was developed. This approach incorporated the following key elements:

- A market characterization based on in-depth interviews of selected Key Market Actors. These Key Market Actors were chosen based on their knowledge of the industry and their market actor type.
- The market characterization was used to inform the research plan.
- Based on the research plan, data were collected from the following:
    - 11 foodservice designers (engineering interviews),
    - 11 cooking equipment manufacturers (engineering interviews),
    - 10 refrigeration equipment manufacturers (engineering interviews),
    - 10 ventilation equipment manufacturers (engineering interviews),
    - A census (36) of end user FSTC participants over the past two years (telephone surveys),
    - 100 California end user nonparticipants (telephone surveys).
- The engineering interviews underwent qualitative analysis, while the participant/nonparticipant telephone surveys were analyzed statistically.
- The findings were reviewed by focus groups of Advisory Board members to address key unresolved issues.
- The quantitative and qualitative analysis findings were melded into overall conclusions and are documented in this report.

Details of the approach and analysis techniques are presented in Section 4, Methodology.

Exhibit 2.3
Evaluation Flow Diagram



2.3 Report Layout

This report is divided into seven sections plus the supporting appendices. These are:

Section 1. Executive Summary –supplies a synopsis of the report findings.

Section 2. Introduction – introduces the program, and presents a synopsis of the evaluation approach, and summarizes the report layout.

Section 3. Theoretical Framework – presents the theory behind the analysis approach.

Section 4. Methodology – presents the approach used to analyze the data and derive the results.

Section 5. Evaluation Results – presents the findings of the evaluation.

Section 6. Recommendations – discusses recommendations emanating from the evaluation.

The appendices contain the full detail of data collection and analysis efforts required to support the body of the report.

Section 3
Theoretical Framework

This section of the report summarizes the program theory by which the FSTC would be expected to affect the market and identifies and defines the market linkages. It then reviews how the initial market barriers were defined, documents what market barriers were hypothesized to be inhibiting the market, and describes how they could manifest themselves for each market actor. The section closes with a discussion of the hypothesized FSTC market effects to be assessed.

3.1 Program Theory

Weiss (1997) stresses that understanding the underlying theory of the program is essential to developing the most appropriate evaluation and that a good evaluation is based on defining, testing, and analyzing the assumptions of the program theory. There are many different areas in which programs can go astray, but by focussing on theory, evaluators can keep themselves on track.

In order to develop an accurate and useful program theory, interviews with FSTC staff and foodservice market leaders were conducted and FSTC documents were reviewed. In general, the theory consists of FSTC activities, the hypothesized direct and indirect communication and causal linkages of these activities to key market actors, and the expected immediate, intermediate, and long-term market effects. A critical element in any program theory is the identification of which market barriers are faced by which market actors.

3.2 Linkages

Exhibit 3.1 contains 21 causal/communication linkages between FSTC activities and immediate, intermediate, and long-range market effects. Each is discussed below in Exhibit 3.2.

Exhibit 3.1
Program Causality Theory

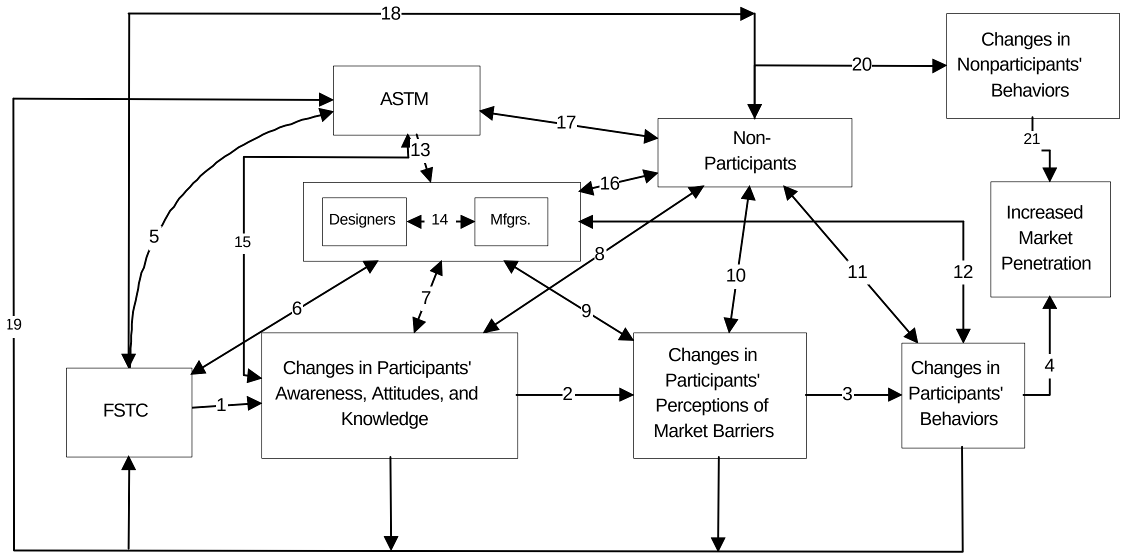


Exhibit 3.2
Linkage Descriptions

Linkage	Causal/Communication Link Description
1	Workshops, seminars, and demonstrations conducted by the FSTC may increase awareness and knowledge of energy efficient equipment. As a result, it is expected that participants will have a more positive attitude toward energy efficient equipment.
2	Participants may perceive certain market barriers to be reduced. For example, their concerns regarding performance uncertainty may be lessened.
3	Participants may purchase or plan to purchase energy efficient equipment.
4	Over time, as participants change their purchase behavior, the penetration of energy efficient equipment will increase.
5	The FSTC develops standard testing methods and proposes their adoption to the ASTM. The ASTM adopts these methods.
6	The FSTC informs manufacturers, distributors, and designers about energy efficient equipment. The manufactures may request that the FSTC test their equipment as well as their competitors' equipment. Distributors and designers may also request information about energy efficient equipment.
7	Increased awareness and knowledge of energy efficient equipment may result in participants seeking more information from manufacturers and kitchen designers regarding performance, cost, durability, etc.

Linkage	Causal/Communication Link Description
8	Participants may interact with nonparticipating end users and, as a result, affect those end users' awareness, knowledge, and attitudes toward energy efficient equipment.
9	Reduction in market barriers is expected to result in participants seeking more information from manufacturers and kitchen designers regarding performance, cost, durability, etc.
10	Reduction in market barriers is expected to result in participants conveying to nonparticipating end users their confidence in the performance capabilities of energy efficient equipment.
11	Changes in participants, and their interactions with nonparticipating end users, may affect nonparticipant purchase decisions.
12	Participant openness to the purchase of energy efficient equipment may result in participants demanding a variety of data such as equipment performance data or demanding that certain equipment meet certain performance standards.
13	The ASTM provides manufacturers, distributors, and designers with standard testing methods.
14	As designers become more knowledgeable about energy efficient equipment, they increasingly request performance data from manufacturers. In addition, as manufacturers increase their customers' appreciation of performance data, they increase the extent to which they provide such data to their customers.
15	As a result of their FSTC experience, participants may be more aware of the ASTM and the standard testing methods.
16	As information becomes more readily available, manufacturers and designers may provide information on energy efficient equipment to nonparticipating end users.
17	The ASTM may also provide nonparticipating end users with information regarding standard testing methods.
18	Nonparticipating end users may be influenced by the FSTC indirectly via publications.
19	After their exposure to the FSTC, participants may request additional information from the FSTC on the energy efficiency and equipment performance.
20	The information from the FSTC, ASTM, manufacturers, designers, and participants may combine to induce nonparticipant end users to purchase energy efficient equipment.
21	It is expected that, over time, as nonparticipant end users change their purchase behavior, penetration of energy efficient equipment will increase.

Each of these linkages is assessed as a component of the hypothesized market effects discussed later.

3.3 Identification of Market Barriers

A key element of program theory is an assessment of the market barriers faced by each market actor. One of the first steps in this study was an initial market characterization, which led to the identification of key barriers. The primary source for the initial market characterization, and thus for identifying market barriers, was the Key Market Actor interviews. The Key Market Actor interviews targeted a spectrum of market actors, including industry associations (i.e., groups promoting a specific point of view), consultants, end users, manufacturers, and trade associations (i.e., groups representing market actors such as manufacturers or restaurant owners). All of these market actors were interviewed by evaluation professionals using an interview guide. The guide promoted in-depth discussion on the workings of the market. The interview guide, with responses to questions, is attached in Appendix B. Questions most relevant to discussion of market barriers are 12 through 15, which asked directly about barriers to energy efficient equipment for four of the market actors (end users, manufacturers, manufacturers' representatives, and designers/specifiers). These responses were then reviewed by the evaluation team and categorized into the specific market barrier language developed by the Eto et. al. Scoping Study[2]. Exhibit 3.3 identifies market barriers identified through analysis of interview responses.

Exhibit 3.3
Market Actor Interview Responses

	Market Actor Affected		
Market Barrier	**End User**	**Mfgr.**	**Designer**
Organizational Practices	√	❖	❖
Performance Uncertainty	√	√	
Asymmetric Information	√		
Information & Search Costs	√		❖
Access to Financing	❖		
Split/Misplaced Incentives	√		
Product Unavailability	❖		❖

√ = Most Important Barrier for End Users ❖ = Lesser Market Barriers for End Users

[2] A Scoping Study on Energy efficient Market Transformation by California Utility DSM Programs. Eto, J.; Prahl, R.; Schlegel, J. July 1996.

As Exhibit 3.3 illustrates, seven market barriers were identified as acting in the market. Access to financing was dropped from consideration due to limitations on survey length. The remaining six barriers were addressed in the market actor questionnaires. A definition of each barrier is provided below.

3.4 Market Barrier Definitions

The following is a general description of how each market barrier is manifested in the foodservice market.

Organizational Practices. The organizational practices market barrier was seen by the respondents to be present for all market actors discussed.

Among end users, this barrier manifests itself in separate decision-making when purchasing equipment. In general, only first cost is considered and long-term payback is not taken into account. This is because capital funds tend to be reserved for expansion, where users believe there will be a greater return on investment. It is these relatively more attractive, competing investments that drive down the consideration of energy efficiency.

Among manufacturers, it is manifested in a slow change from traditional products and production techniques, along with a reluctance to spend money on retooling for new products.

Among manufacturers' representatives, it emerges because representatives are captive to the line of equipment the manufacturer produces. If their manufacturer does not have efficient equipment, they try to steer the customer away from energy efficiency.

For the designer, the issue is that their customers are generally demanding lowest first-cost because of the value put on capital for expansion. As a result, they are generally responding to customer demand and find "selling" energy efficiency an uphill battle.

For all of the other market actors, this market barrier is closely connected to the high value they put on the present value of money. As organizations, they tend to have somewhat high discount rates, i.e., they do not believe that future savings from efficient equipment offset the current value of the money.

Performance Uncertainty. Performance uncertainty was identified by all types of users except the designers. Designers are considered the best informed market actors because they are required by their trade to gather information on a spectrum of equipment in order to make intelligent recommendations to their customers.

Asymmetric Information. The asymmetric information market barrier arose only for the end users when all parties were queried as to whether end users believe equipment performance claims (Appendix B, question 11). While the respondents confirmed a high degree of current skepticism, they gave credit to the ASTM test methods for bringing standardized information to the industry and pointed out that the ASTM standard test results have proven how bogus some prior claims were, thus increasing industry mistrust of broad efficiency claims.

Information and Search Costs. The information and search cost market barrier is primarily due to a lack of awareness in the industry of the value of energy efficiency. This lack of awareness is tied to the low interest in energy efficiency in this sector arising from the fact that energy costs are such a low percentage of overall operating costs.

Access to Financing. Access to financing is only a market barrier for some medium-sized and small users. This lack of access is tied to the high failure rate in the foodservice sector, a phenomenon well understood in the banking industry. However, because this applies to only a small portion of the market, it is not considered a significant barrier and in light of reducing a lengthy survey, it was not addressed in the evaluation.

Split Incentives. The split incentives market barrier, while only associated with the end user, is still considered to be a significant barrier because it appears to apply to all but the most integrated companies. The general practice in the industry seems to be that there is no connection between the operational decision-making process and new construction or purchasing decision-making processes. This market barrier is strongly associated with the high value placed on the present value of capital funds for growth. Because of this, all capital expenditures are viewed under the "lowest first cost" microscope, and the foodservice equipment costs simply fall within the overall category of capital costs.

Product Unavailability. The product unavailability market barriers play a role for several market actors. For end users, equipment must be readily available in the size they need when they need it. If not, it is less likely it will be installed. Similarly, for larger chains it must be available nationwide. If not, it is unlikely to be adopted. For the manufacturers' representatives, if it is not available in their product line, they will not promote it. Designers need to have a range of equipment to offer their customers. If they have only one efficient model, it becomes much harder to fit it into the designs and to sell the customer on its unique advantages. In general, "efficient products" based on standardized tests are only beginning to enter this market. Given this, product unavailability did not seem to be a major obstruction to energy efficiency in the market, in that other market barriers overshadowed it. However, manufacturers were queried about product unavailability.

The primary market barriers identified in the foodservice industry during the market characterization are organizational practices, performance uncertainty, asymmetric information, information and search costs, split incentives, and product unavailability. These are the market barriers targeted during data collection and focused on during the analysis. In addition, all market actors were given several open opportunities to identify additional barriers that may be acting in the market. No other significant barriers were identified.

After the market characterization and identification of the potential market barriers, data collection instruments were created and data collected to support (or refute) the hypotheses created by the evaluation team.

3.5 Market Effects Hypotheses

Any reduction of the market barriers listed in Exhibit 3.3 is in turn hypothesized to cause certain market effects. For the market-effects portion of the analysis (Project Objectives 6 and 7), eleven research hypotheses concerning market effects were established. The hypothesized market effects organized by market actor are presented below.

Participants

1. FSTC activities will cause participants to experience an increase in awareness and a more positive attitude toward energy efficient cooking, refrigeration, and ventilation equipment.
2. The FSTC will reduce select market barriers for FSTC participants.
3. FSTC activities will cause participants to increase the extent to which they share information about energy efficient technologies.
4. FSTC activities will cause participants to increase the extent to which they require performance data when assessing products for installation.
5. FSTC activities will cause participants to increase the extent to which they purchase energy efficient equipment.

Nonparticipants

6. FSTC activities, through effecting changes in other aspects of the market, will cause nonparticipants to increase the extent to which they require performance data when assessing products for installation.
7. FSTC activities, through effecting changes in other aspects of the market, will cause nonparticipants to increase the extent to which they purchase energy efficient equipment.

Manufacturers

8. The FSTC activities will increase the extent to which manufacturers use FSTC test data.
9. The FSTC activities will increase the extent to which manufacturers use standardized test methods to develop new equipment.

Designers

10. The FSTC activities will increase the extent to which designers request performance data.
11. The FSTC activities will increase the extent to which designers recommend energy efficient equipment.

Hypotheses 1 through 5 address the immediate impacts of the FSTC on participants. These hypotheses had quantitative statistical analysis used to determine the level of impacts. Hypotheses 6 through 11 represent intermediate and long-range impacts on the nonparticipants, manufacturers, and designers. These six hypotheses were examined based on qualitative analysis of self-reported data collected during structured interviews with a limited number of market actors from each group. Thus, the conclusions that can be drawn on these six hypotheses are limited. The more rigorous tests for effects on these groups can only be done when data have been collected over time so that trends can be observed.

Section 4 Methodology

This section of the report identifies the data sources for the evaluation, summarizes data preparation techniques, describes the analytical approaches used for each type of assessment, and describes forecasting techniques.

4.1 Data Sources

This subsection discusses the existing data sources used to inform the evaluation, the sample design for further data collection (by data collection type), and then summarizes the actual data collected.

4.1.1 Existing Data

A considerable amount of data were already available to support the market effects evaluation and baseline study when the evaluation started. The first data collection task for the evaluation was a literature review. The entire literature review memorandum is attached in Appendix A of this report. An overview of the sources that actually contributed data to the evaluation is presented in the following:

- **FSTC Program Participation Records**: The participants in FSTC activities were obtained from a sign-in book maintained by the FSTC. This list contained 765 names collected in 1998. Of these names, 595 were unique. This list was used to determine the first set of participants for the participant survey.
- **FSTC Budgets**: Annual and forecasted budgets were available for 1992 through 1998.
- **Total Number of Subscriptions to *Foodservice Equipment reports*:** Subscriptions to *Foodservice Equipment reports* were available from 1996 through the present.
- **PG&E DSM Program Tracking System**: Information on measures installed via the various PG&E commercial DSM programs, other than the FSTC, were available from PG&E.
- **1997 PG&E Commercial Energy Use Survey -** This report was used to determine the number of PG&E accounts in the foodservice industry as well as the energy use, regardless of whether the foodservice energy consumption occurs in hotels, hospitals, restaurants, schools, etc. This information was useful in characterizing the market.

4.1.2 Sample Design

This section presents the data collection sample design by market actor type.

4.1.2.1 Participants

Construction of Frame - For the purposes of the evaluation, participants were defined as all end users who had contact with the FSTC, either through visits to the PG&E San Ramon site or outreach by the FSTC staff at various sites throughout California. Only participant end users were considered to be part of the sample frame. The FSTC database was used to obtain contact information. Since records were not kept prior to that time, this database only covers the past two years. The database began with 595 unique names. Records were dropped as shown in Exhibit 4.1, leaving 98 names for the participant telephone survey.

Exhibit 4.1
Participant Sample Design

Sample Design	N
Unique Names	595
No Phone Numbers	(65)
Evaluation Team Members or Close Affifiliates	(19)
Duplicate Name	(23)
Out of the country	(12)
Bad number	(2)
Multiple People in Company	(376)
Unique Company and Name	98

Sample Selection – The 98 unique names were randomly ordered and called. After exhausting all but 30 names on this list, there were only 16 completed interviews. With such a low response rate, the remaining names were expected to provide only 6 or 7 more completed interviews. In an effort to increase the number of participant completions, the evaluation team went back to the FSTC to obtain a list of end users from all their contact lists, not just the original database. This list consisted of an additional 32 names. In order to assure that the completion rate was higher than with the original sample dataset, each of the 32 names in the second sample were contacted by members of the FSTC, either through e-mail or via a phone message, to encourage them to participate in the telephone survey. The final call disposition can be found in Appendix C.

4.1.2.2 California Nonparticipant End Users

Construction of Frame - Since this study was designed as a true statewide study, the sample frame consisted of all restaurants in California. There were various ways by which this sample frame could be constructed. The first method (assessed, but not used) would be to obtain, from the four California investor-owned utilities (IOU), PG&E, Southern California Edison, Southern California Gas, and San Diego Gas & Electric, the billing data of those customers who, according to their SIC codes, are restaurants. One could then combine these files and stratify these restaurants by energy consumption. However, this approach would miss several important service territories: Sacramento Municipal Utility District and Los Angeles Department of Water and Power (LADWP). Missing the LADWP service territory is particularly critical since it has the highest concentration of restaurants in California. In addition, these files do not contain the key stratification variables of service style (full-service versus quick-service) and owner (chain or independent), which, according to our interviews with FSTC staff and the Key Market Actors, are important in terms of discriminating between those customers who invest in energy efficiency and those who do not.[3] In addition, they do not always contain a telephone number and contact person. Finally, to coordinate the collection of restaurant accounts and combine them into restaurant facilities, given the various ways that utilities aggregate accounts to the premise level, seemed particularly difficult, if not impossible, given the tight schedule for this project. Finally, whether the utilities in question would be willing to supply the data in the current deregulation environment seemed very doubtful.

The other approach, the one chosen, involved obtaining a sample drawn randomly from *all* restaurants in California, not just the ones in the four IOU service territories. This information, purchased from the marketing information firm NPD, also contained owner, service style, contact name, telephone number, customer name, and address. That energy use data were not available was compensated for by the presence of these other variables.

Sample Selection – The NPD sample frame, containing 63,491 restaurants as of February 1999, is maintained by the Foodservice Industry Group of NPD. FSTC staff and members of the Key Market Actors indicated that time is a very scarce commodity in the foodservice industry. A sample of 1,500 restaurants (2.36%) was selected from the 63,491 since a very low response rate was expected. More specifically, from each California county, a proportional (2.36%) stratified, random sample was selected, totaling 1,500 names, addresses and telephone numbers of restaurants.[4] The stratum was whether a restaurant was a sit-down or fast food restaurant.

These 1,500 restaurants constitute a large sample that accurately reflects the population of California restaurants. In this sample, 47.2% of the restaurants are full-service, while 52.8% are quick-service. Given this nearly even split, it was decided to provide the data collection team with the 1,500 restaurants randomly sorted. Their instructions were to begin at the top of the list and continue interviewing until the target of 100 completes was achieved.

The key question is whether the achieved sample reflects the population of California restaurants. That is, is there any evidence of non-response bias in the achieved sample? To answer this question, the 1,500 restaurants from NPD were compared to the 100 restaurants in the achieved sample with respect to chain versus independent and full-service versus quick-service, and the four combinations of ownership and service style. Exhibit 4.2 through Exhibit 4.4 present these three comparisons.

[3] That is, the relationship of energy consumption at the site level to a willingness to investment in energy efficiency may be weaker than the relationship of energy consumption at the site level to owner and service style.

[4] Five counties were not included in the NPD sample due to low counts, i.e., 2.36% of the quick-service or full-service restaurants in each of these counties resulted in less than 1 restaurant. These counties are: Alpine, Colusa, Modoc, Sierra, and Trinity.

Exhibit 4.2
Starting Sample and Achieved Sample by Ownership

	Chain	Independent	Total
Starting Sample	42.2%	57.8%	100%
Achieved Sample	46.0%	54.0%	100%

Exhibit 4.3
Starting Sample and Achieved Sample by Service Style

	Full-Service	Quick-Service	Total
Starting Sample	47.2%	52.8%	100%
Achieved Sample	47.0%	53.0%	100%

Exhibit 4.4
Starting Sample and Achieved Sample by Ownership/Service Style Combinations

	Full-Service/ Chain	Full-Service/ Independent	Quick-Service/Chain	Quick-Service/ Independent	Total
Starting Sample	19.9%	32.9%	37.9%	9.3%	100%
Achieved Sample	17.0%	36.0%	37.0%	10.0%	100%

The analysis, using chi square, indicated that the observed differences between the starting sample of California restaurants and the achieved sample with respect to independent versus chain, full-service versus quick-service, and the various combinations are not statistically significant. From these analyses, it was concluded that, given the available variables, there is no evidence of non-response bias. The final call disposition can be found in Appendix D.

4.1.2.3 Designers

Construction of Frame – There are a relatively small number of kitchen designers in the nation.[5] These designers perform work throughout the United States, and often internationally. The frame was based on kitchen designers located within the United States.

The ability to obtain contact information on these market actors was an issue that was resolved by obtaining the Foodservice Consultants Society International Member

[5] Based on the industry expert (a kitchen designer) on the evaluation team.

Directory. However, since membership in this organization is made up of more than just kitchen designers, the team's industry expert culled through the names and marked all the kitchen designers. The frame consisted of 42 names of kitchen designers.

Sample Selection – These names were chosen at random for solicitation in the designer survey. The plan called for 10 completed interviews. Of the 42 original names, 11 completed the survey, 6 refused the survey, 8 were never called, 2 had wrong numbers, and 15 were called at least once with messages left and no other follow up.

4.1.2.4 Manufacturers

Construction of Frame – Since the sale of manufacturers' product is national, it was determined that exclusion of manufacturers outside of the state of California would be inappropriate. Therefore, manufacturers located within the United States or with a large percentage of their product sold in the US, but located in Canada, were included in the sample frame. The North American Association of Food Equipment Manufacturers (NAFEM) was the source for the sample frame. The Program and Exhibit Guide for the 1997 NAFEM Convention, held in New Orleans, was used to pull contact names and numbers for the sample frame.

Sample Selection – The product index in the 1997 NAFEM Program and Exhibit Guide was used to pull out manufacturer names in the three end uses of cooking, refrigeration, and ventilation. Exhibit 4.5 shows the starting sample size for each manufacturer type.

Exhibit 4.5
Sample Size for Manufacturers

Manufacturer Type	Size of Sample
Cooking	70
Refrigeration	35
Ventilation	30

The evaluation team was interested in hearing from the cooking manufacturers that sold the most units. Therefore, the cooking manufacturers were ranked based on suspected size, with 22 ranked as larger manufacturers and, therefore, to be called first. The remaining 48 were to be called secondarily. For the actual calls, all sample sizes were given a random number and then sorted by ranking and random number.

The refrigeration and ventilation manufacturers were given a random number and called in that random order.

4.1.3 Data Collection

Exhibit 4.6 presents the planned data collection from the Research Plan, the modified plan based on Comments on the Research Plan, and the actual number of data points collected during the evaluation effort.

Exhibit 4.6
Planned and Actual Data Collected

Data Collection Type	Original Plan (# of Points)	Final Plan (# of Points)	Actual (# of Points)
Key Market Actors	13	13	13
FSTC Participants	50	50	36
California End Users	100	100	100
Kitchen Designers	20	10	11
Manufacturers, Total	21	30	31
Cooking	7	10	11
Refrigeration	7	10	10
Ventilation	7	10	10
Total	204	203	191
Focus Groups	2	2	2

The following sections discuss each of the survey and data collection efforts.

4.1.3.1 Interviews with Key Market Actors

Originally, the market characterization was to be based on in-depth interviews of the FSTC Advisory Board Members. A closer review of the composition of the Advisory Board prompted a reassessment of this strategy, resulting in interviewees being selected from a wider field of candidates. In constructing the revised list of interviewees, the FSTC staff provided information to help identify personnel who had a broad background and were knowledgeable regarding the overall interactions and linkages in the industry. In addition, the evaluation used the expertise of industry expert, Mr. Carl Vail of Cini-Little International.

Exhibit 4.7 lists both the targeted and completed interviews by category of interviewee. In Exhibit 4.7 a somewhat arbitrary distinction is made between "Technical Associations", such as gas or electric industry associations, and "Trade Associations", such as restaurant or foodservice associations.

Exhibit 4.7
Market Characterization Data Collection Distribution

Interviewee Type	Sample	Planned Completes	# Completed
Industry Associations	4	2	2
Foodservice Consultants	4	2	5
End Users	4	2	2
Manufacturers	2	2	1
Publications	2	2	1
Trade Associations	3	2	2
Utility	2	2	0
Total	21	14	13

Interviews were conducted with 13 key market actors, some of whom were members of the FSTC Advisory Board, while others were from the broader industry (e.g., manufacturers, consultants, publishers, etc). The final sample list was designed to incorporate the broadest possible points of view from the industry. In many cases, the categories may be misleading due to people moving from job to job. For example, the reason that so many foodservice consultants were interviewed is that many of them previously worked for large end users, manufacturers, or utilities.

These interviews were used to better understand the structure of the foodservice market, its actors, and their interrelationships. The respondents also provided key insights about the market barriers relevant to each market actor.

The interview guide, along with the coded responses, are presented in Appendix B.

4.1.3.2 Literature review

The literature search focused on articles and research in the areas related to the Study objectives. Of specific interest were documents on evaluation techniques used in similar programs, industry size and structure, and the industry testing process. There are many methodological lessons that can be learned from the first generation of market transformation studies in California.

Most of the literature on actual efficiency testing is from the FSTC, since there are few organizations conducting energy efficiency testing for foodservice equipment. Other industry information is available from other foodservice players, such as foodservice consultants and the various trade and industry associations. In addition, the University of California library system was searched through their on-line Melvyl® search system. The list of literature reviewed is shown in Appendix A.

4.1.3.3 The NPD Foodservices Group and RECOUNT â

The NDP Food Services Group offers foodservice industry information via a database called RECOUNT®. RECOUNT® tracks unit counts for chain and independent restaurants by market and trade area across the U.S. and Canada. Restaurants are identified by chain affiliation or independent ownership, service style, food specialty, address, phone number, zip code, city, county, market area and region. A portion of this database was purchased and used to construct the 1,500 California end user sample frame from which a random sample was drawn for interviewing. The data also provided interesting firmographic information on the type and distribution of foodservice facilities throughout California.

4.1.3.4 Interviews with FSTC Staff

The evaluation team conducted interviews with FSTC staff in order to better understand the activities of the FSTC, how it interacts with others in the marketplace, and to identify information that is potentially useful to this evaluation.

4.1.3.5 Telephone Surveys with FSTC Participants

Telephone surveys, averaging 25 minutes, were completed with 36 participants. FSTC participants are individuals who participated in an FSTC activity and who influence decisions on equipment purchasing. The questions focused on the impact of the FSTC on attitudes, awareness, and behavior regarding energy efficient kitchen, refrigeration, and ventilation equipment. Questions were also asked about perceptions of market barriers. Appendix C contains the participant instrument and response frequencies.

4.1.3.6 Telephone Surveys with Nonparticipant California End users

Telephone surveys, averaging 25 minutes, were completed with 100 nonparticipant end users in California. Questions focused on attitudes, awareness, and behavior regarding energy efficient cooking, refrigeration, and ventilation equipment. Questions were asked about perceptions of market barriers. Appendix D contains the nonparticipant instrument and response frequencies.

4.1.3.7 Interviews with Kitchen Design Consultants

Interviews, averaging 28 minutes, were completed with 11 kitchen design consultants. Senior evaluation staff conducted these interviews. Questions focused on awareness and attitudes towards energy efficient cooking, refrigeration, and ventilation equipment, and the extent to which the consultants recommend these technologies to their clients. Questions were also asked regarding perceptions of market barriers. Appendix E contains the kitchen designer interview instrument and response frequencies.

4.1.3.8 Interviews with Kitchen, Refrigeration, and Ventilation Manufacturers

Interviews, averaging 21 minutes, were completed for 11 cooking manufacturers. The 10 refrigeration manufacturer interviews averaged 15 minutes and the 10 ventilation equipment manufacturer interviews averaged 17 minutes. Senior evaluation staff conducted these interviews. Questions focused on awareness and attitudes towards energy efficient equipment and the extent to which the manufacturers recommend these technologies to their clients. Questions were also asked regarding perceptions of market barriers. Appendix F contains the manufacturer interview instruments and response frequencies.

4.2 Data Preparation

This section describes the preparation of the data collected from participants and nonparticipant end users. These were the datasets used in the statistical analyses.

4.2.1 Data Documentation

Data cleaning consisted of first reading the raw data into SAS, conducting logic checks to determine if there were any interviewing or data entry errors resulting from complicated skip patterns or inconsistent variable definitions (i.e., character versus numeric) across both the participant and nonparticipant surveys. Next, wild codes were identified as possible data entry errors. Finally, variable names and value labels were added to describe each variable.

4.2.2 Missing Data

Missing data were handled using the data imputation routine in PRELIS 2, the companion preprocessor to LISREL 8 (Joreskög and Sörbom, 1999). The values substituted for missing values were obtained from other cases with a similar response pattern over a set of matching variables.

4.2.3 Exploratory Factor Analysis

Originally, the questionnaires were specifically designed to address attitudes toward energy conservation and the five market barriers, with anywhere from two to seven questions each. It was originally assumed that these questions could be used to form six scales. The scales are a composite of multiple items (e.g., an average) that are all designed to measure the same construct (e.g., attitudes toward energy conservation or perceptions of performance uncertainty). The motivation for constructing multiple-item scales is that the measurement of the construct is more reliable than using a single item (Carmines and Zeller, 1979). That is, a scale score that is an average of five questions is more reliable than any one of the individual questions that contribute to the average.

The development of the scales was done in two steps. First, an exploratory factor analysis was conducted. Factor analysis addresses the problem of analyzing the structure of the interrelationships (correlation) among a large number of variables (e.g., questionnaire responses) by defining a set of common underlying dimensions, known as factors. The variables that are correlated with (load on) a given factor can be combined using, for example, an average. This scale (the average) is then used in subsequent analyses rather than using the individual responses to the questions. One question answered by factor analysis is whether the questions that were originally thought to measure, for example, organizational practices, actually load on the same factor (i.e., go together), and can, therefore, be combined to form an organizational practices scale.

The factor analyses were conducted using PRELIS 2 (the pre-processor to LISREL 8).

The results of the factor analysis confirmed our original thinking about the attitude questions and the organizational practices market barrier questions. That is, the attitude questions loaded on one factor and the organizational practices questions, with one exception, loaded on another factor. However, for the remaining four market barriers, the results of the factor analyses were difficult to interpret. Therefore, the *a priori* assumptions about which questions addressed which market barriers were used to form the scales for these four market barriers.

The next question is whether the questions that were combined (based on the factor analyses and our original assumptions) to form a scale are sufficiently internally consistent (i.e., reliable) to actually be used as scales. Cronback's alpha is a statistic that assesses the consistency of an entire scale, with an alpha of 0.6 being the minimum acceptable level of reliability for a scale. Cronback's alpha was calculated for each of the six scales that were constructed. All of the scales, except split incentives, met this minimum criterion.

The questions from the participant and nonparticipant end user questionnaires that were used to form the scales and the associated Cronback's alpha are presented in Exhibit 4.8.

FSTC participants and nonparticipant end users were factor analyzed together in preparation for the analyses that involved comparisons of the two groups with respect to attitudes, market barriers, and preferences. However, for the baseline portion of the study, nonparticipant end users were factor analyzed separately. The results indicated that the questions used to form the scales for the participant and nonparticipant analysis could be used to form the scales for the baseline analysis. The details of the factor and reliability analyses are presented in Appendix H.

Exhibit 4.8
Questions Contributing to Scales

Scale	Questions in Participant Questionnaire	Questions in End user Questionnaire	Cronback's Alpha*: End User	Cronback's Alpha: End User & Participant
Attitudes Toward Energy Efficiency	Q8a, Q8b, Q8c, Q8d, Q8e	Q9a, Q9b, Q9c, Q9d, Q9e	0.77	0.80
Split Incentives	Q16, Q17	Q27, Q28	0.37	0.36
Organizational Practices	Q9, Q10, Q12, Q13, Q14, Q15	Q20, Q21, Q23, Q24, Q25, Q26	0.63	0.67
Performance Uncertainty	Q18a, Q18b, Q18c, Q19a, Q19b, Q19c, Q20a, Q20b, Q20c	Q29a, Q29b, Q29c, Q30a, Q30b, Q30c, Q31a, Q31b, Q31c	0.81	0.84
Information-Search Costs	Q21a, Q21b, Q21c, Q22a, Q22b, Q22c, Q23a, Q23b, Q23c	Q32a, Q32b, Q32c, Q33a, Q33b, Q33c, Q34a, Q34b, Q34c	0.84	0.84
Asymmetric Information	Q24a, Q24b, Q24c, Q25a, Q25b, Q125c, Q26a, Q26b, Q26c	Q35a, Q35b, Q35c, Q36a, Q36b, Q36c, Q37a, Q37b, Q37c	0.84	0.85

*Cronback's alpha of 0.6 or higher means an acceptable level of reliability

The next section discusses the analytical techniques used.

4.3 Analytical Techniques

As Exhibit 2.3 makes clear, qualitative and quantitative techniques were used in this study. The quantitative technique relied on "objective" closed-ended questions that could support statistical analyses. However, *qualitative* data can be equally useful. (Britan, 1978; Weiss and Rein, 1972; Patton, 1987). *Qualitative* methods stress in-depth, open-ended interviews, direct observation, and written documents, including open-ended questions and program records. There is wide agreement on the value of using *both* qualitative and quantitative data in the evaluation of many kinds of programs.

Qualitative techniques were used primarily for the analyses of designer and manufacturer data, while statistical techniques were used primarily for the analyses of participant and nonparticipant end user data. Note that the designer and manufacturer analyses employed some quantitative techniques and the participant and nonparticipant end user analyses used some qualitative techniques.

The integration of quantitative and qualitative data can be challenging. Such integration often involved exercising judgement in deciding how much weight to give the quantitative and qualitative data and how to integrate the two in a manner that was internally consistent. This includes identifying coherent and important examples, themes, and patterns in the data. The analyst looks for quotations or observations that go together and are relevant to the customer's decision to install the energy efficient equipment. Guba (1978) calls this process "convergence," i.e., the extent to which the data hold together or dovetail in a meaningful way.

The analytic techniques used in characterizing the market, constructing the baseline, and measuring market effects are described below.

4.3.1 Market Characterization

Market characterization describes the specific market targeted by the program (technologies, services, or products offered) and identifies the market's geographic boundaries. It also documents the structure of the market and describes the type of interactions and market events that trigger transactions between buyers, intermediaries, and sellers. Finally, the market characterization provides estimates of the number of buyers, intermediaries, and sellers in the market, as well as the order of magnitude of annual sales of the technologies targeted by the program.

The initial market characterization study was conducted at the beginning of the FSTC Market Effects Study. The purpose of the initial market characterization was to inform the research plan and evaluation data collection process. After all of the data were collected from the remainder of the evaluation, the market characterization was updated. As a result, this discussion focuses primarily on the methodology for the initial market characterization. At the end of that discussion, a short synopsis is presented of primary data sources used to update the initial market characterization.

4.3.1.1 Initial Market Characterization

The market characterization covered only commercial sector eating and drinking establishments, to the exclusion of institutional (e.g., prisons, hospitals, and schools) and military markets. This is because commercial market eating and drinking establishments represent approximately 90% of the foodservice technology market. Similarly, the market characterization focused on kitchen equipment and not on "standard" commercial equipment such as lights, insulation, windows, and HVAC. This is because these "standard" types of equipment are promoted by wider commercial energy efficiency programs and are not unique to the foodservice market.

Data analysis involved a combination of qualitative and quantitative techniques and was guided by the key elements in the definition of market characterization. The qualitative analysis relied upon in-depth interviews with FSTC staff and market leaders and a review of the following documents, which provided data on the market size and distribution by restaurant type:

- 1998 National Restaurant Association Restaurant Industry Pocket Fact Book.
- Fast Facts – 1998 California Restaurant Association Restaurant Industry.
- NPD Recount Database of Restaurants in California.
- NAFEM Program & Exhibit Guide. *Exploring the Universe of Foodservice Equipment and Supplies*. September 5-7, 1997, New Orleans, LA.
- Market Leader Interview Responses, Question 8.

Information on the number of market events were extracted from a presentation by Arthur D. Little entitled, *Opportunities and Competition in the Foodservice Industry* and presented at the 1995 Sales and Marketing School put on by The New England Gas Association on February 10, 1995. These numbers were adjusted to reflect approximate 1998 sales.

The quantitative analysis was straightforward, involving cross-tabulation of responses.

4.3.1.2 Updated Market Characterization

Once the entire evaluation was complete, the market characterization was reviewed and updated in light of additional data. Primary adjustments to the market characterization resulted from the FSTC Advisory Board focus groups and interviews of the designers and manufacturers. Both data collection methods encouraged the kind of in-depth discussion that illuminated the roles and relationships of the foodservice industry market actors.

4.3.2 Baseline Construction

One of the key objectives of this study was to establish a baseline so that future studies will have valid and reliable points of comparisons. The baseline attempted to identify the current level of market barriers and any market effects possibly attributable to FSTC activities. Baseline data were collected from nonparticipant end users, designers, and manufacturers. Information collected focused on perceptions of market barriers and any resulting current and future market effects. Comparisons were often made between independents and chains and between quick-service and full-service restaurants. Frequencies, chi square, t tests, analysis of variance, and factor analysis were used to analyze these data.

4.3.3 Market Effects Measurement

The measurement of market effects are required by Project Objectives 6 and 7 repeated below:

6. Collect quantitative and qualitative data to test the hypothesized market effects. Focus on both end user and supply-side market actor interviews. Investigate the feasibility of using a control area to test for market effects.
7. Link hypothesized market effects with market barriers.

There were a number of methodological issues surrounding the measurement of market effects. These concerned the formation of both in-state and out-of-state comparison groups, appropriate analytical approach, and the longevity of any observed market effects.

4.3.3.1 Out-Of-State Comparison Group

The evaluation team explored the possibility of forming an out-of-state comparison group since this kind of comparison group can be very useful in attributing the participant impacts to any intervention program. It was concluded that an out-of-state comparison group should not be formed for this study. The main reason for this decision was that the focus of the FSTC has, for years, been both regional (the PG&E service territory) and national. The FSTC has worked closely with national manufacturers and national chains as well as other out-of-state utilities in an effort to encourage the production and adoption of energy efficient kitchen equipment.

This national focus was underscored by comments made by Key Market Actor interviewees. They were asked to identify the primary audiences of the FSTC. They frequently mentioned manufacturers, large regional and national chains, and other out-of-state utilities. The greater the extent to which the FSTC is effective at the national level, the smaller the expected difference between California and an out-of-state comparison area. Small, non-significant differences could be misinterpreted as program ineffectiveness rather than as a sign of program effectiveness. In other words, if the FSTC has played a role in transforming the market, any comparisons will reveal smaller differences.

The FSTC began publication of *Kitchen Monitor* in 1990, a magazine that focused on efficient foodservice equipment and was targeted to a national audience. While the *Kitchen Monitor* ceased publication in 1993, another magazine, *Foodservice Equipment reports*, with much the same focus, began publication in late 1996. This magazine, with regular and significant FSTC input, currently has 33,000 subscribers throughout the U.S. and is targeted to decision-makers in companies that annually spend $100,000 on kitchen equipment.

Thus, while California businesses benefit, those outside California are also affected by the FSTC's efforts in the testing of manufacturers' equipment, development of standard testing methods, national conferences and seminars, and submittals to *Foodservice Equipment reports*.

For these reasons, the team concluded that a comparison group would add little to the ability to address the research objectives for this study.

4.3.3.2 In-State Comparison Group

While an out-of-state comparison group could not be used, an in-state group comprised of 100 nonparticipating end users, used primarily for constructing a baseline, was also used as a comparison group. This in-state comparison group was used in estimating the direct immediate or proximate impacts of the FSTC on participants. In Exhibit 3.1, linkages 1, 2, 3, 4, 7, 9, and 12 reflect the hypothesized immediate impacts. Of course, any differences may not be statistically significant because the FSTC is also indirectly targeting nonparticipants through manufacturers, designers, the ASTM and even directly through their articles in *Foodservice Equipment reports*. Thus, it is expected that such a comparison group will become increasingly less useful over time given the expected cumulative impacts on nonparticipants. Over time, this cumulative impact should result in smaller and smaller differences between the two groups. However, at this point in time, the availability of this in-state comparison group presented a rare opportunity to estimate the immediate effects of the FSTC.

However, such comparisons are not straightforward given that such a comparison is classified as a "static group comparison" research design (Campbell and Stanley, 1966). This design collects data from a group after participation at the FSTC and from a group of nonparticipants at the same time and compares the results. Note that there are no pre-measures of, for example, perceptions of market barriers. As a result, any observed differences could well come about because certain types of customers sought out the services of the FSTC. That is, before participating at the FSTC, participant perceptions of the market barriers may have already been lower than nonparticipant perceptions, and these perceptions may have continued to decrease simply because of their customer characteristics. This bias is referred to as selection bias. Efforts to mitigate this source of bias are described later.

4.3.3.3 Analytical Approach

This section summarizes the analysis techniques used during the evaluation.

Self Reports – In some cases, the only available data were the responses of a market actor with no other points of comparison. For example, designers were asked the extent to which they ask manufacturers about energy efficient cooking equipment. Because their responses cannot be compared to those of any comparison group, there are no firm conclusions regarding the role of the FSTC in causing designers to make such requests. However, in other cases, self-report data are somewhat more compelling. For example, manufacturers were asked whether they had ever taken any of their equipment to the FSTC for testing. Fifty-five percent of the cooking equipment manufacturers indicated they had. While it is impossible to tell what these manufacturers would have done in the absence of the FSTC, no other centers currently provide comparable testing. In this case, there appears to be a prima face case that the FSTC has had a substantive impact on manufacturers of cooking equipment.

T Tests and Chi Square – When participant and nonparticipant end user comparisons were possible, either chi square or t tests were calculated to determine statistical significance, depending on whether the data were interval, ordinal, or nominal. The strength of the relationships was also reported. However, with ordinal and nominal data, it was not always possible to control for any group differences owing to the cell size requirements of chi square. With interval data, attempts to control for group differences using regression techniques are described below.

Regression Analysis – With interval data, t-statistics were always calculated to determine statistical significance. However, selection bias is a potential problem since the two groups differ on a number of key variables. Some of these variables are number of full-time employees, size of business, number of other sites in California, and whether respondents think the greatest opportunity to reduce costs is in equipment purchases. These differences may affect their attitudes, knowledge, awareness, and behaviors, in addition to whether or not they participated in FSTC activities. To control statistically for these observed differences, a regression model was estimated with the company's attitude toward energy conservation as the dependent variable and number of employees, size of company, and number of other California sites as the independent variables or covariates.

However, there are unobserved differences that may still affect attitudes, knowledge, awareness, and behaviors. To control for any unobserved differences, an inverse Mills ratio was inserted into the regression model. First, a logit model was estimated for participation in FSTC activities. This model takes the following form:

$$P_{P_i} = \frac{e^{bZ_i}}{1 + e^{bZ_i}} \tag{1}$$

where

P_{p_i} = the probability of participating in FSTC activities for the i^{th} customer
Z_i = the vector of explanatory variables corresponding to the i^{th} customer that affect the choice to participate
b = the vector of estimated coefficients that maximizes P_{P_i}.

The variables included in vector Z are premise characteristics that may have affected the decision to participate. These variables include size of the customer's facility, number of other sites in California, and number of full-time employees. Next, an inverse Mills ratio was calculated using the estimated probability of participation. For participants, it was calculated as:

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

For nonparticipants, it was calculated as:

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

where

P= the probability of participation.

Then the regression model was estimated, incorporating the inverse Mills ratio as an additional independent variable.

Thus, the general form of the regression model was:

$$\mathrm{Y}_{\mathrm{i}} = a + b_1\mathrm{Mills}_{\mathrm{i}} + b_2\mathrm{Part}_{\mathrm{i}} + \sum b_{\mathrm{k}}\mathrm{X}_{\mathrm{k,\,i}} + e_{\mathrm{i}} \tag{4}$$

where

Y_i =	the dependent variable of interest, e.g., performance uncertainty
$Mills_I$ =	the Mills ratio associated with the ith customer
$Part_I$ =	the binary variable indicating whether one participated in activities at the FSTC
X_k =	the vector of explanatory variables corresponding to the ith customer that affect the dependent variable of interest
b_1 =	a coefficient that reflects the change in the dependent variable associated with a one unit change in the Mills ratio
b_2 =	a coefficient that reflects the change in the dependent variable associated with being a participant or not
b_k =	a vector of coefficients that reflect the changes in the dependent variable associated with one unit changes in the explanatory variables

4.3.4 Longevity of Observed Market Effects

Prahl (1998) has noted three examples of evidence that could help to support a claim that any observed market effects are sustainable. The first is whether the observed market effects, such as the retooling of manufacturing production lines, are inherently difficult to reverse. The second is the successful prediction of near-term market indicators expected to lead to long-term market effects. The last is whether the sequence of observed market effects to date are as predicted by the initial justification of the program.

One of the near-term predicted effects is that key market barriers, as perceived by FSTC participants, will be lower as a result of participation. It is also expected that participants may decide to change their behavior with respect to seeking out more information regarding energy efficient equipment and deciding to purchase more efficient equipment. For manufacturers, an indication could be their decision to test their own equipment using standard testing methods and to provide the results of these tests to designers and end users.

4.4 Forecasting Future Effects

This section summarizes the analytical techniques used to assess the projections of market potential and to hypothesize future market effects.

4.4.1 Forward-Looking Assessment of Market Potential

First, it is recognized that there are essentially three types of potential: 1) technical potential, 2) economic potential, and 3) market potential. Technical potential is defined as all customers who are eligible to purchase a given piece of equipment. For the three end uses on which the evaluation focused, this is all restaurants and their cooking, refrigeration, and ventilation equipment. The economic potential is defined as that portion of the technical potential that is cost effective. For example, a rule of thumb is that equipment that has a simple payback of two years or less is cost effective from the customer's perspective. Market potential is defined as that portion of the economic potential than is realistically achievable. That is, not everybody is perfectly rational and people do not always possess perfect information due to imperfections in the market. The point of market transformation programs is to reduce the gap between economic and market potential. For the purpose of this study, it was assumed that economic potential is 85% of technical potential and market potential is 85% of economic potential.[6] These assumptions lead to an economic potential equal to 72% overall.

We first discuss estimating the market potential. In the commercial foodservice industry, small restaurants rely, to a very large extent, on used equipment. This has the effect of decreasing the market potential even further since they are much less likely to purchase state-of-the-art equipment and, when compared to larger restaurants, will tend to possess less efficient equipment. The evaluation estimate of the percentage of small restaurants, 47%, is obtained from the nonparticipant end user survey. Further, it is assumed that at least 70% of the small restaurants purchase used equipment. Thus, the market potential is reduced to 39% or [0.72 – (0.70 * 0.47)].

In order to estimate market potential, it is necessary to estimate the total number of California restaurants at some future time and the number of cooking, refrigeration, and ventilation units expected to exist per restaurant in California at that future time. The evaluation team chose to look ten years into the future (2010) since that appeared to be a reasonable time in which these technologies could be expected to penetrate the market. From these two pieces of information, one can derive the total number of cooking, refrigeration, and ventilation units expected to exist in California in 2010. This

---

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

number represents the technical potential. Of this, 85% was assumed to be the economic potential (i.e., cost effective). The question is: What percentage of the cooking, refrigeration, and ventilation market potential will be realized by 2010?

The restaurant forecast was based on several other pieces of information. The first piece of information was the number of households per restaurant in 1999 provided by NPD. The second was a forecast of California households. Using a Holt exponential smoothing model (see Appendix H for details), the number of California households was forecasted through 2010 using historical data provided by the U.S. Census Bureau. NPD provided California household estimates, but only for 1998. The NPD 1998 value was 97.6% of the 1998 U.S. Census value. Using this factor, the U.S. Census historical data and forecast were then adjusted downward in order to match the NPD assumption. Using the NPD households per restaurant number in combination with the household forecast, the number of restaurants through 2010 was forecasted.

In addition, estimates of the number of cooking, refrigeration, and ventilation pieces of equipment per restaurant were developed. This information was obtained from the *Characterization of Commercial Building Appliances* (Arthur D. Little, 1993). This report contained estimates on the percentage of restaurants that had at least one of the particular pieces of cooking equipment (e.g., fryers, ovens) or refrigeration equipment (e.g., coolers, commercial refrigeration). For those restaurants that had at least one piece of a particular kind of equipment, this report also provided an estimate of the number of units per restaurant. Using this information in conjunction with the restaurant forecast, it was possible to estimate the total number of units of cooking, refrigeration, and ventilation equipment (See Appendix H for details).

4.4.2 Hypothesized Future Market Effects

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

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

where

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

Typically, the Ino and Imi parameters are estimated with a multiple regression analysis from a product's historical sales data and then used to predict the penetration of market potential.[7] However, this approach does not work in a situation where there is little or no historical data. Consequently, an analogical diffusion model was explored.

Analogical diffusion models follow the structure of Equation 5. The literature was reviewed to identify estimates of the two parameters (Ino and Imi) that were estimated from the historical data of existing product analogies, market studies, and published data. Sultan et al. (1990) conducted a meta-analysis of 213 studies incorporating various technologies that estimated the Ino and Imi parameters. They found that the Ino parameter averaged 0.03 and the Imi parameter averaged 0.38. These findings suggest that the diffusion process is more affected by such factors as word-of-mouth than by an innate consumer tendency to be innovative. In another study, Mahajan et al. (1990) examined a wide range of consumer durables and found that for residential refrigerators, the ratio of Imi to Ino was 85.7 and for air conditioners it was 40.6 (both of which have labeling systems), underscoring the main point of Sultan et al (1990). However, commercial refrigeration, cooking, and ventilation have no such labeling systems and are not, therefore, strictly analogous, i.e., similar ratios cannot be assumed.

Before presenting the estimates of Ino and Imi, it is essential to underscore the obvious: for these three end uses there is a fair amount of uncertainty regarding these parameters and their diffusion. For example, the size of the advertising budget for the FSTC, future funding from the State for DSM programs, the price of electricity, or the health of the economy cannot be predicted. More important, there is no information regarding the current penetration of energy efficient cooking, refrigeration, and ventilation equipment. Have said this, for each end use, two sets of diffusion parameters were developed that defined two scenarios. One set of parameters represented the current situation, one without a labeling system. The second set represented a situation in which a labeling system is in place. The intention here is to set the bounds within which families of possible diffusion curves may exist.

Thus, estimates of Ino and Imi were started at no lower than 0.03 and 0.38 respectively and the parameters were varied based on an understanding of the technologies, their history in California DSM programs, and the FSTC's activities over the last decade. The base, no-label, Imi parameter was different for each end use. End users are

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

expected to know more about refrigeration equipment because of nearly twenty years worth of utility experience in commercial refrigeration and the existence of a labeling program in the residential sector that may have served to sensitize non-residential customers to the benefits of energy efficient refrigeration equipment. Therefore, both the Ino and Imi parameters are the highest for refrigerators, suggesting that innovators have been exposed to a fair amount of information regarding energy efficient refrigerators and that word-of-mouth communication is probably high. Cooking equipment has the second highest Ino and Imi parameters because of the FSTC's involvement in testing cooking equipment and the development of standard testing methods and their eventual adoption by the ASTM. Ventilation has the lowest Ino and Imi parameters since end users have been exposed to relatively little information and word-of-mouth is probably low. Ventilation has the same parameters, as suggested by Mahajan et al. (1990). The parameters under the labeling scenario are the same, since it was assumed that all labeling programs would be equally effective at increasing penetration.

The Ino and the Imi parameters for each end use and for each scenario are presented in Exhibit 4.9

Exhibit 4.9
Ino and Imi Parameters by End Use and Scenario

Scenario	Ino	Imi
Cooking Equipment: No Labels	0.04	0.55
Cooking Equipment: Labels	0.06	0.76
Refrigeration Equipment: No Labels	0.05	0.60
Refrigeration Equipment: Labels	0.06	0.76
Ventilation Equipment: No Labels	0.03	0.38
Ventilation Equipment: Labels	0.06	0.76

With respect to the current levels of penetration and in the absence of utility saturation data at the required level of detail regarding energy efficiency, 25% for refrigeration was assumed because of greater familiarity with refrigeration due to past efforts of the FSTC and nearly 20 years of utility rebate programs. For cooking, 10% was assumed because of the FSTC's work with large chains, manufacturers, and the ASTM. For ventilation, only 5% penetration was assumed.

This completes the discussion of methods. The next section begins the discussion of the evaluation results.

Section 5
Results of Analysis

The results of the analysis are couched in terms of the 14 research objectives listed in Section 2.2. The first five research objectives are all concerned with characterizing the market. Objectives 6, 7, and 11 are concerned with the measurement of any market effects and the development of new methods for measuring market effects. Research objectives 8, 9, 10, and 12 are concerned with establishing a baseline and forecasting future market effects. Finally, objectives 13, and 14 are concerned with recommendations for program improvements and future studies.

5.1 Market Characterization Summary

This section presents a summary of the market characterization. The market characterization covers Research Objectives 1, 2, 3, 4, and 5.

In order to establish a sound foundation for the evaluation plan, the first project task was the completion of a market characterization for the foodservice market. This section presents a summary of the market characterization findings in order to set the stage for discussion of market effects. Readers who wish more detail on the methods and findings should refer to the full market characterization study presented in Appendix G.

The market characterization describes the specific market targeted by the program (technologies, services, or products offered) and identifies the market's geographic boundaries. It documents the structure of the market and describes the type of interactions and market events that trigger transactions between buyers, intermediaries, and sellers. In addition, the market characterization provides estimates of the number of buyers, intermediaries, and sellers in the market, and the order of magnitude of the annual sales of technologies targeted by the program. The following key characteristics describe the market being evaluated:

5.1.1 Geographic Boundaries

The boundaries are those of the state of California. However, it is recognized that the FSTC is almost certainly impacting the market outside California.

5.1.2 Market Segment

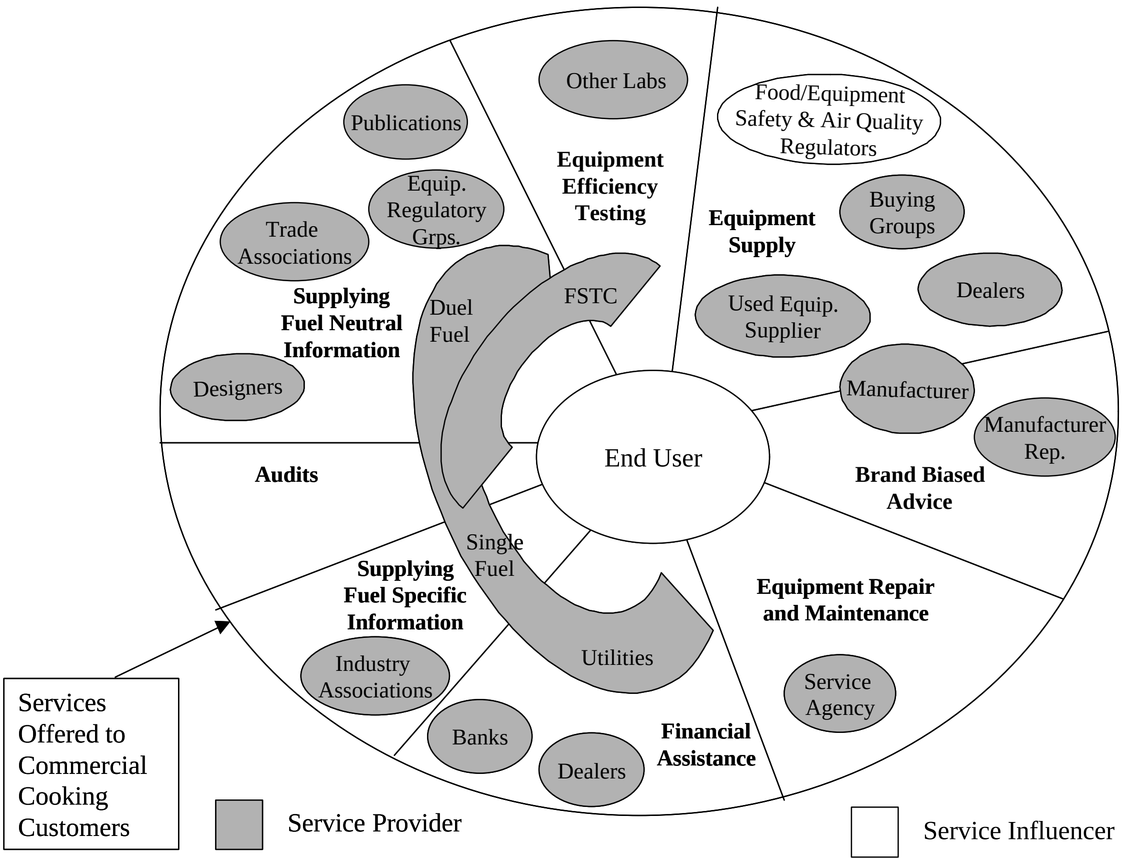
The market segment being studied is the commercial kitchen efficiency market[8]. This market segment can be viewed as having two elements: the foodservice facility efficiency element (i.e., building, lighting, insulation, window, and HVAC efficiency), and the kitchen equipment efficiency element (i.e., the cooking hood ventilation system, cooking equipment, and sanitation equipment efficiency).

5.1.3 Market Actors

The foodservice market has many different market actors. For the purposes of this market characterization, the services provided within the commercial kitchen equipment efficiency market were divided into eight primary services. These services are illustrated in Exhibit 5.1, along with the market actor offering the various services.

[8] Institutional (e.g., prisons, hospitals and schools) and military markets were not included because the commercial eating and drinking establishments market represents approximately 90% of the foodservice technology market. The study focused on the largest part of the market.

Exhibit 5.1
Services Offered to Commercial Kitchen Customers



As illustrated by Exhibit 5.1, there are many service providers in the commercial kitchen market, with many of the service providers supplying services in several service sectors. As will be discussed later, not all end users have a need for, or access to, all of the services or service providers available in the industry.

5.1.4 Technologies

The foodservice efficiency market can be divided into three categories: building efficiency measures, food preparation equipment efficiency measures, and sanitation equipment measures.

5.1.4.1 Building Measures

This category for the foodservice industry closely mimics the building efficiency measures that are applied in most other sectors. It includes shell thermal and infiltration performance, lighting use efficiency, and heating, ventilation, and air conditioning (HVAC) efficiency. With respect to building efficiency measures, the foodservice industry is unique in three primary ways: (1) the tremendous internal heat load represented by the cooking equipment, (2) the large amount of moisture generated in food processing, cooking, and sanitation tasks, and (3) the high air-change rates required for the kitchen hood exhausts. All of these create higher HVAC loads.

This having been said, most of the energy efficiency measures applied in other sectors (anti-infiltration measures, high-efficiency windows, thermal insulation, high efficiency HVAC, high efficiency lighting), are still applicable to the foodservice market sector. Indeed, the long hours of operation and high energy loads make them even more effective in this sector.

5.1.4.2 Foodservice Equipment

Foodservice equipment category is the first thing most people think of when the foodservice market sector is discussed. The foodservice equipment category covers a wide range of products, including:

- Cooking equipment, including:
  - Ranges
  - Griddles
  - Fryers
  - Broilers
  - Steamers
  - Ovens
  - Hot Food tables
- Kitchen ventilation equipment
- Refrigeration equipment including:
  - Standing refrigerators
  - Walk-in refrigerators
  - Cold tables
  - Ice makers

Many of these technologies have a wide range of variations in equipment types and configurations. For example, griddles can be single-sided or double-sided and can have conveyors. Ovens can have steam, rotisserie, and convection options, not to mention configurations large enough to walk into. Most technologies can be obtained in either gas or electric versions.

For ventilation systems and walk-in refrigerators, the equipment configuration is often custom fabricated for each particular situation.

5.1.4.3 Sanitation Equipment

The sanitation equipment category primarily covers dishwashing equipment, hot water use in the kitchen, and hot water booster heaters. The booster heater is designed to increase the water supply temperature going to the dishwasher so that it meets the minimum temperature required for safety. The dishwashing configurations include rinsing stations and dishwashers, with varying levels of automation. In most cases, the dishwasher configuration is custom designed to fit the space, the dishwashing load, and the configuration of the foodservice establishment.

5.1.4.4 Market Events

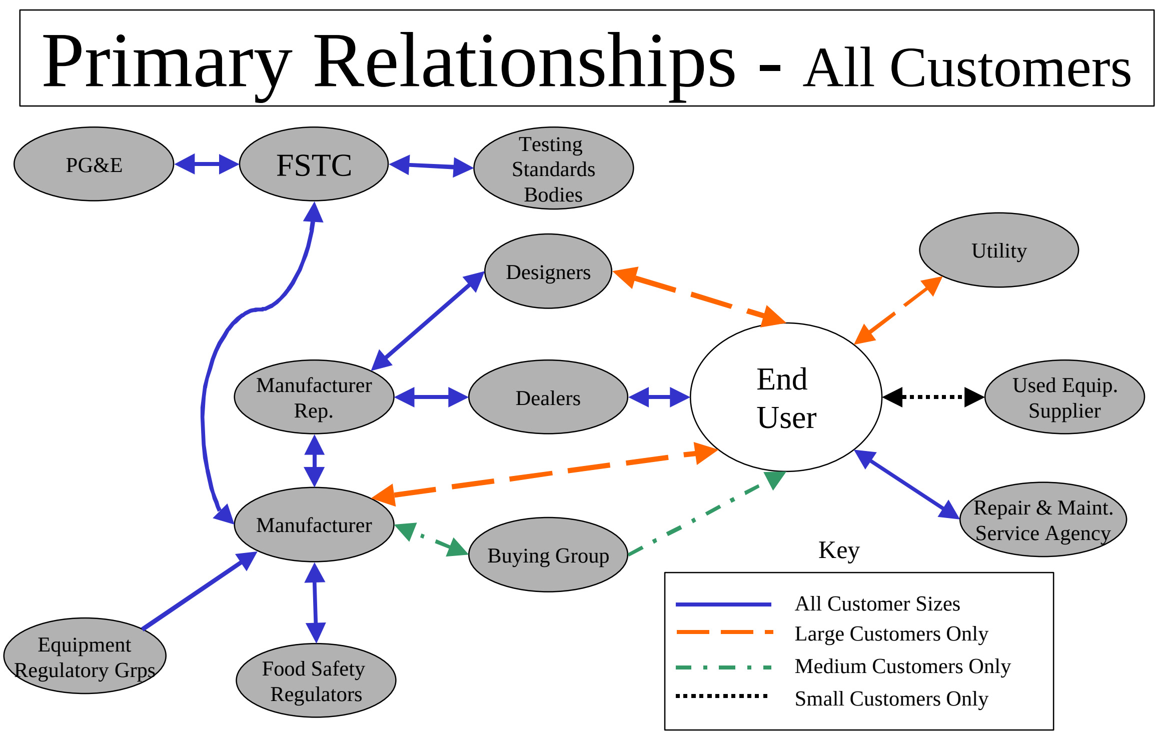
The primary market event of interest in the foodservice equipment arena is the sale/purchase of a unit of equipment. Updated Arthur D. Little (ADL) estimates indicate that there were in excess of 150,000 units of high value equipment sold in the U.S. in 1998. Prorated, this represents about 12,000 units in California. These events are precipitated by construction of new restaurants, replacement of worn out equipment stock, and menu changes. The ADL study indicates that approximately two-thirds of these market events result from the replacement of closed restaurants (and presumably replacement of worn out stock), while one-third represents actual increase in restaurant capacity.

5.1.5 Market Structure

The market structure for the foodservice market is extremely complex. It involves many market actors at each market level. In addition, interactions between market actors vary by customer size.

The major market interactions identified in the market characterization are illustrated in Exhibit 5.2. This exhibit illustrates the size of the end user effects, where they interact , and why the interaction occurs. The cooking manufacturer interviews illustrated that the FSTC is exerting major influence on testing standards groups and cooking equipment manufacturers. While there are indicators of effects on other actors, the interviewees clearly indicated that currently these cannot be considered strong interactions.

Exhibit 5.2
Primary Foodservice Market Interactions



5.1.6 Market Character

One of the most important facts that emerged from market characterization is that energy efficiency appears to be a very low priority for foodservice providers. Market forces seem to dictate a low priority for energy efficiency. Some of the market forces that create this situation are:

- Energy costs represent 3% to 5% of operating costs for most foodservice providers while labor and material costs are on the order of 30% each.
- The primary objective for most entrepreneurs is growth. Keeping their capital costs down maximizes their return on investment, which attracts capital. As such, commercial kitchen equipment costs are kept as low as possible as part of the overall pressure to minimize capital spending.
- Performance, reliability, durability, and cost almost always come before energy efficiency in end users' selection criteria. As the size of the end user decreases, price rapidly becomes the most important purchase decision.

5.1.7 Market Size

In 1998, the total U.S. foodservice market is estimated to be about $336 billion with California representing about 8%. There are about 800,000 foodservice locations nationwide, with about 72,000 in the California market and about 63,500 of these being fast-food or sit-down restaurants. One of the defining characteristics of the market is the large number of foodservice equipment manufacturers, with estimates of about 200 to 250 manufacturers of energy-consuming equipment. It is estimated that only two or three of these manufacturers have annual revenues in excess of $20 to $30 million. The typical equipment manufacturer is estimated to have annual revenues of less than $5 million.

5.2 Baseline

The answers to the questions in the market actor surveys create a snapshot of the market at this time. Since there has been no previous evaluation of the FSTC, the surveys represent the market baseline for future evaluations.

5.2.1 Participant

The baseline was only constructed for nonparticipant end users. Participant characteristics are presented in Section 5.3.1.1.

5.2.2 Nonparticipant

5.2.2.1 Firmographics

This section presents the basic information about each restaurant. As mentioned in Section 4.1.2, these restaurants are representative of the population of California restaurants.

Restaurants can be categorized in a number of different ways, including style of service, ownership status, and size. Exhibit 5.3, Exhibit 5.4, and Exhibit 5.5 present this information.

Exhibit 5.3
Service Style

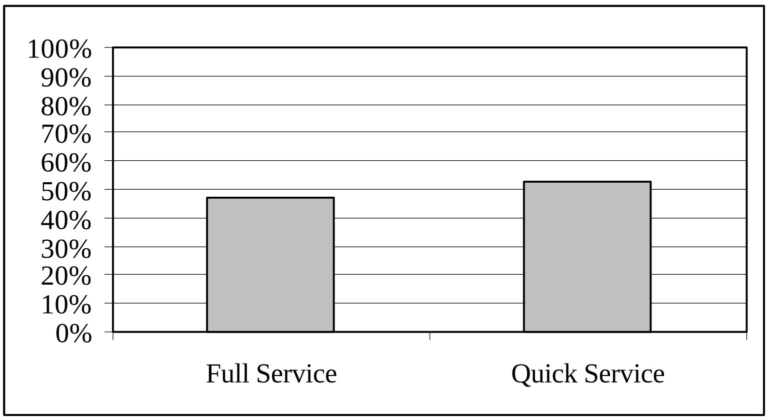


Exhibit 5.4
Owner Status

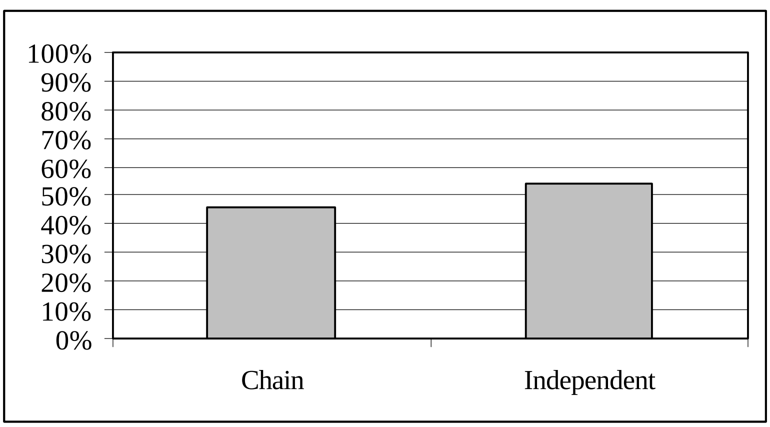


Exhibit 5.5
Service Style by Owner Status

	Full-Service	Quick-Service	Total
Chain	10	36	46
Independent	37	17	54
Total	47	53	100

These exhibits illustrate that restaurants are almost evenly split between full-service and quick-service and between chain and independent. In addition, 10% of California restaurants are full-service chains, 37% are full-service independents, 36% are quick-service chains, and 17% are quick-service independents.

Exhibit 5.6, Exhibit 5.7, and Exhibit 5.8 present the number of full-time employees at each site, the size of the restaurant, and the number of other sites in California.

Exhibit 5.6
Number of Full-Time Employees at this Site

	Frequency	Percent
0 to 5	49	49
6 to 10	17	17
11 to 15	11	11
16 to 20	7	7
21 to 25	3	3
26 to 30	2	2
> 30	11	11
Total	100	100

Exhibit 5.7
Size of Restaurant

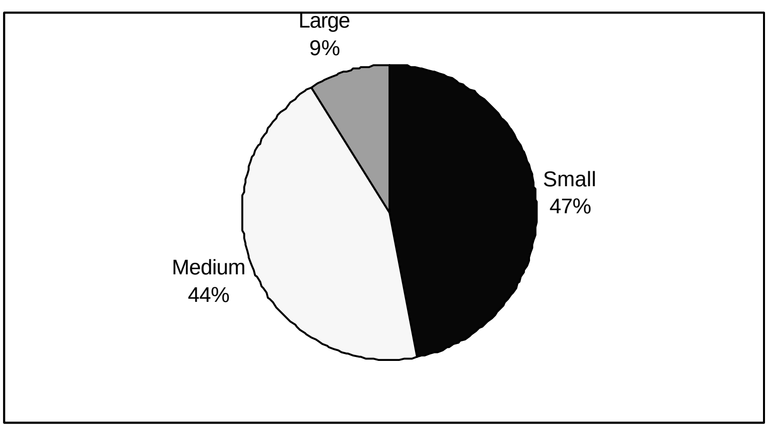


Exhibit 5.8
Number of Other Sites in California

	Frequency	Percent
0	38	38
1	29	29
2	8	8
3 to 5	6	6
6 to 10	7	7
> 10	12	12
Total	100	100

Nearly half of the restaurants are small, with five or fewer full-time employees. In addition, 62% of the restaurants have at least one other site in California. There were six restaurants representing very large chains with each having over 100 sites in California.

Exhibit 5.9 breaks downs restaurants by type of food served and nationality.

Exhibit 5.9
Restaurant Category

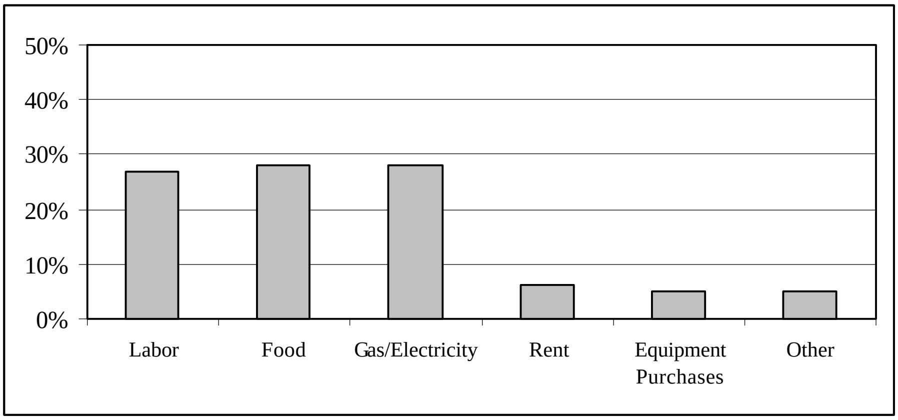
Category	Frequency	Percent
All Other	16	16
Asian	9	9
Bagel	1	1
Bar & Grill	3	3
Barbecue	1	1
Buffet Steak	2	2
Chicken	2	2
Deli	2	2
Donut	4	4
Family Style	1	1
Frozen Sweets	4	4
Gourmet Coffee Tea	2	2
Hamburger	5	5
Hot Dog	2	2
Indian	1	1
Italian	3	3
Mexican	13	13
Other Ethnic	3	3
Other Sandwich	2	2
Pizza Italian	13	13
Salad Soup	1	1
Seafood	4	4
Subs	6	6
Total	100	100

Restaurants that serve Mexican food and pizzas represent slightly more than one quarter of the California restaurants.

5.2.2.2 Attitudes and Business Concerns

Basic attitudes towards primary business concerns and energy efficiency are also of interest. Exhibit 5.10 and Exhibit 5.11 present this information.

Exhibit 5.10
Greatest Opportunities for Reducing Foodservice Operating Costs



Labor, food and gas/electricity are considered almost equally important by the end users and together are far more important than rent and equipment purchases. It is not immediately clear how to interpret these responses. If gas and electricity costs are relatively important, then the lack of concern about equipment purchases may indicate that purchasing energy efficient equipment is not seen as a viable way to reduce energy costs. Or it may mean that the question was too general and did not distinguish kitchen equipment from lights, heating, and air conditioning. Again, the responses could mean either scenario and the evaluation team could not resolve the question.

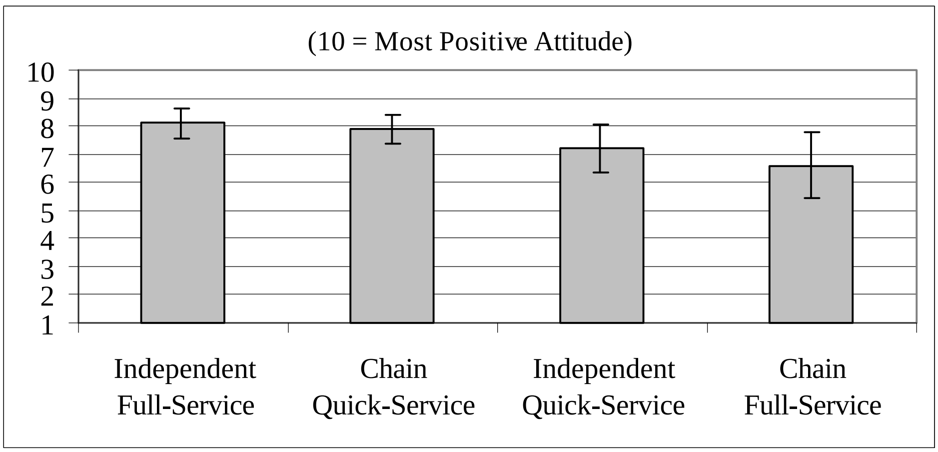
End users were asked five questions regarding their company's attitude toward energy efficiency. This is important under the hypothesis that the more positive the attitudes, the more likely it is that one will purchase energy efficient equipment. Exhibit 5.11 presents the mean responses based on a scale of 1 to 10, with the most positive attitude being a 10. These values in Exhibit 5.11 indicate a very positive attitude towards energy efficiency; however, this may be due to the respondents' desire to be politically correct in their responses.

Exhibit 5.11
Attitudes Toward Energy Efficiency

	Mean	**95% CL (+/-)**
Improving energy efficiency to reduce operating costs	8.7	0.35
Improving energy efficiency to protect the environment	8.0	0.47
Your energy concerns compared to other business concerns	6.8	0.49
Recycling more to reduce costs	7.4	0.55
Recycling more to protect the environment	7.7	0.51

When one examines these attitudes for chain versus independent, the difference is not statistically significant (t=0.99, p=0.32). For quick-service versus full-service, the difference is again not statistically significant (t=0.45, p=0.65). However, when one examines attitudes by combination of chain/independent and quick-service/full-service, some patterns do emerge. Full-service chains have the least positive attitudes toward energy conservation. However, it is not clear why this would be the case. Exhibit 5.12 presents a breakdown of attitudes by various combinations of ownership and service style.

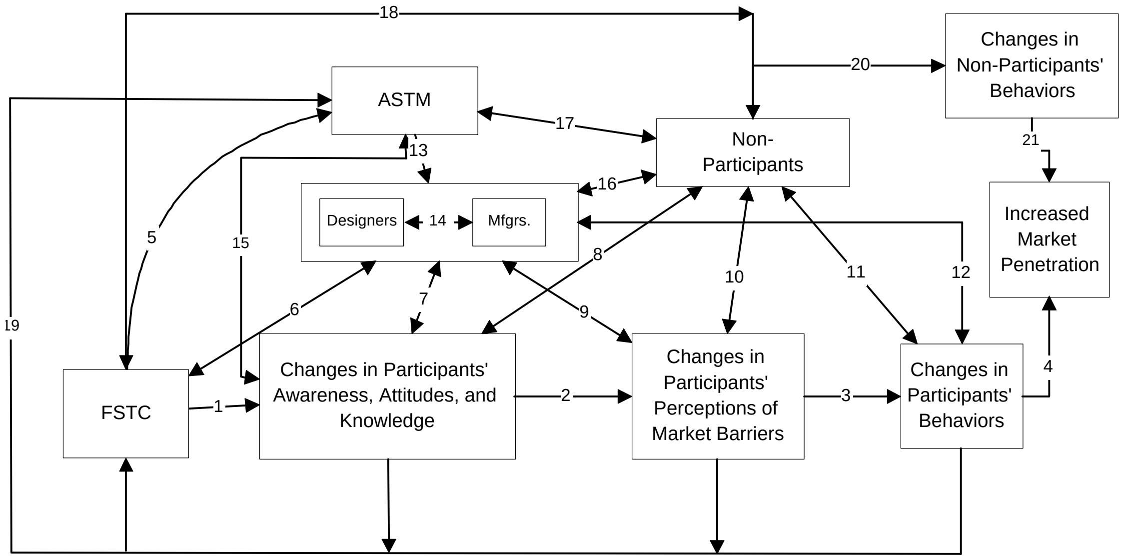
Exhibit 5.12
Attitudes Toward Energy Efficiency by Service Style/Ownership Combinations



5.2.2.3 Linkages

There are 21 linkages illustrated in Exhibit 5.13 (a reproduction of Exhibit 3.1). Of these, end users are involved in seven (# 8, 10, 11, 16, 17, 18, and 20). In this section, the information related to each of these seven linkages will be described.

Exhibit 5.13
Program Causality Theory



In Exhibit 5.14, for each of the end uses, the number of times manufacturers/designers have recommended energy efficient cooking equipment is shown (Linkage #16).

Exhibit 5.14
Recommendations Made by Manufacturers and Designers to End Users

	Mean # of times	95% CL (+/-)
In the past few years, how often has your dealer, manufacturer, their sales representative, or designer recommended cooking equipment which saves energy?	1.7	0.61
In the past few years, how often has your dealer, manufacturer, their sales representative, or designer recommended refrigeration equipment which saves energy?	2.0	0.61
In the past few years, how often has your dealer, manufacturer, their sales representative, or designer recommended ventilation equipment which saves energy?	1.2	0.45

As one can see, information is most often offered for refrigeration equipment, followed by cooking equipment and ventilation equipment.

In Exhibit 5.15, for each of the end uses, the number of times that the end users have requested information regarding efficient equipment is shown. This again is linkage #16, but from the end users' perspective.

Exhibit 5.15
Information Requested by End Users from Manufacturers and Designers

	Mean # of times	95% CL (+/-)
Within the past few years, how many times have you asked your dealer, manufacturer, their sales representative, or designer about cooking equipment which saves energy?	1.5	0.53
Within the past few years, how many times have you asked your dealer, manufacturer, their sales representative, or designer about refrigeration equipment which saves energy?	2.2	0.98
Within the past few years, how many times have you asked your dealer, manufacturer, their sales representative, or designer about ventilation equipment which saves energy?	1.0	0.37

The data indicate that end users request information more frequently for refrigeration equipment, followed by cooking and ventilation equipment. While information is flowing in both directions, it appears that this communication is underutilized.

End users were asked the number of times within the last few years that they shared information with colleagues or promoted internal policies regarding energy efficiency. Exhibit 5.16 presents this information.

Exhibit 5.16
Sharing Information About Energy Efficiency

	Mean # of times	95% CL (+/-)
Demonstrated or explained to a colleague the benefits of energy efficiency.	3.9	1.63
Promoted or implemented changes to internal policies or practices in response to information from colleagues about energy efficiency.	4.0	1.61

The mean number of times is nearly identical for the two questions. These two communication channels seem to be used much more than the channels between end uses and manufacturers and designers.

The next linkages are indirect communication and flow from the FSTC through the *Foodservice Equipment reports*, the ASTM, FSTC participants, or the designers and manufacturers to the larger marketplace populated by nonparticipant end users. Exhibit 5.17 and Exhibit 5.18 present the responses to the general awareness questions.

Exhibit 5.17
Heard of the FSTC

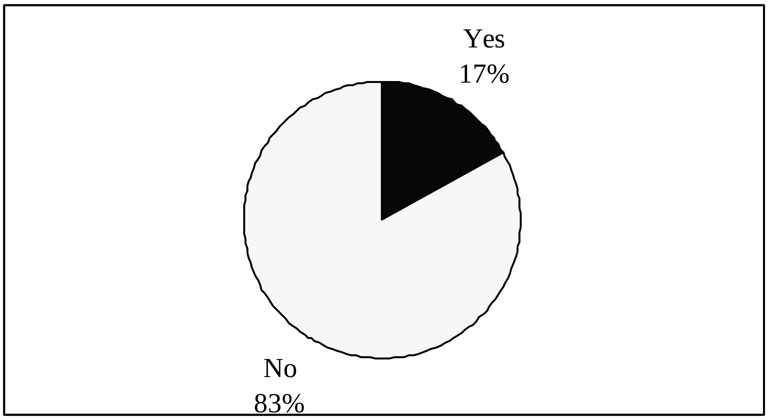


Exhibit 5.18
Where Heard About FSTC*

	Frequency	Percent
Manufacturer	0	0
Publication	6	35
Trade Show	2	12
Other End User	0	0
Utility	3	18
Dealer	2	12
Other	4	24
Total	17	100

From these two exhibits, one can see that 17% of the respondents have heard of the FSTC, which seems quite high given that the respondents are scattered throughout California. Of this 17%, 35% found out about the FSTC through a publication, 18% from a utility, and 12% from a dealer.

Another set of questions addressed awareness of the ASTM. Exhibit 5.19, Exhibit 5.20, Exhibit 5.21, Exhibit 5.22, and Exhibit 5.23 present the responses to a series of five ASTM-related questions.

Exhibit 5.19
Heard of ATSM

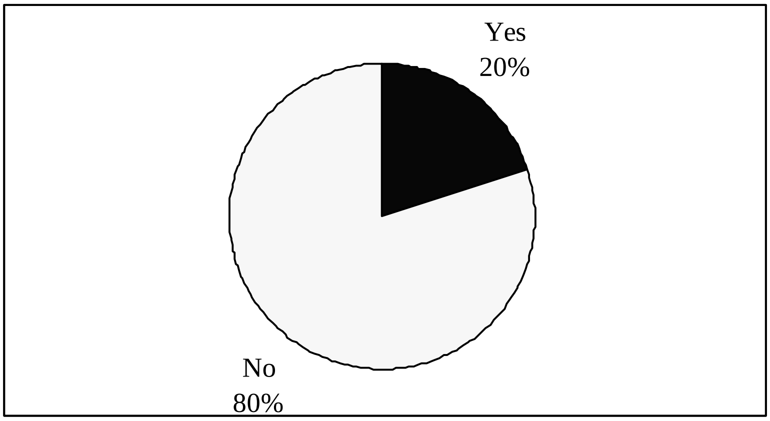


Exhibit 5.20
How Heard of ASTM

	Frequency	Percent
Manufacturer	0	0
Publication	12	60
Trade Show	0	0
Other End User	0	0
Utility	2	10
Dealer	0	0
FSTC	0	0
Other	6	30
Total	20	100

Twenty percent of the respondents have heard of the ASTM. Of this 20%, 60% found out about the ASTM through a publication and 10% from a utility.

All end users were then asked about their awareness of the testing methods of the ASTM. That 38% go on to state they are somewhat or very aware of the ASTM test methods is puzzling since only 20% originally stated they were aware of the ASTM. It may have been that describing the test methods triggered some latent recall of the ASTM. At any rate, of this 38%, 29% found out about the test methods through a publication and 16% found out from a dealer. Of this 38%, 32% have asked about the performance of specific pieces of equipment on these tests.

Exhibit 5.21
How Aware of ASTM Testing Methods

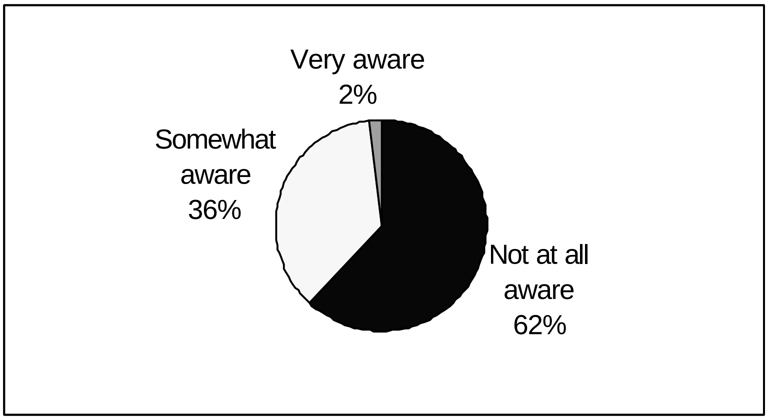
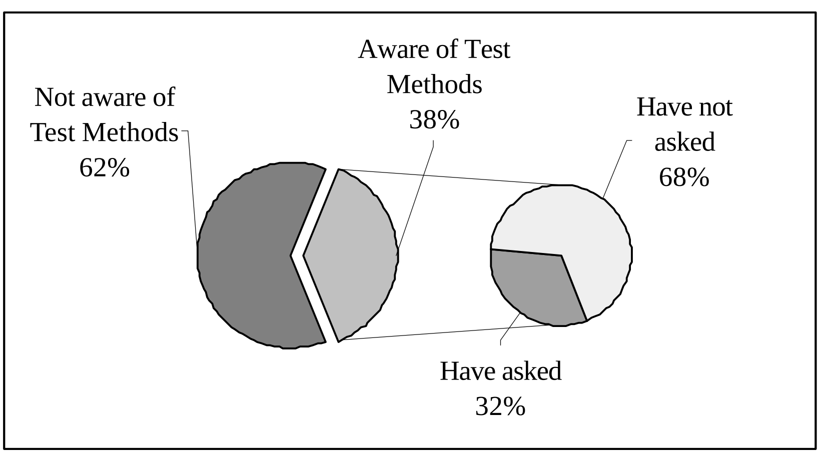


Exhibit 5.22
How Heard of Testing Methods

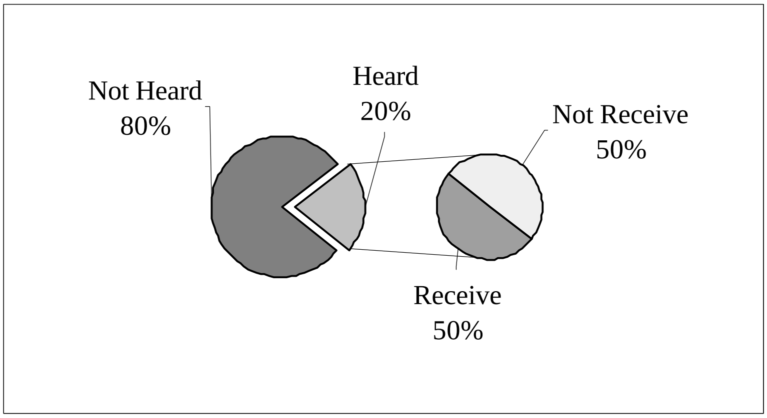
	Frequency	Percent
Manufacturer	1	3
Publication	11	29
Trade Show	0	0
Other End User	0	0
Utility	4	11
Dealer	6	16
FSTC	0	0
Other	16	42
Total	38	100

Exhibit 5.23
Ever Ask Dealers or Manufacturers About Performance of Specific Equipment



The next set of questions focused on *Foodservice Equipment reports*, which is yet another examination of Linkage 18. The results are presented in Exhibit 5.24.

Exhibit 5.24
Heard of and Receive Food Service Equipment Reports

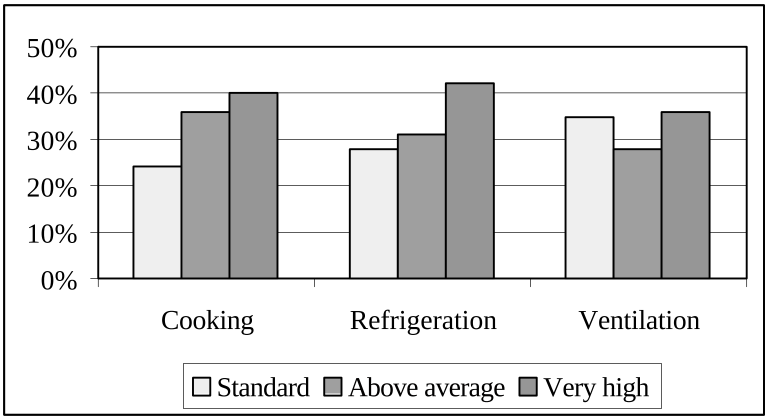


Twenty percent of the respondents (twenty people) indicated that they had heard of *Foodservice Equipment reports*. Of this 20%, 50% actually receive the magazine. This somewhat low percentage is not too surprising since this magazine currently has 33,000 subscribers throughout the U.S. but is targeted to decision-makers in companies that annually spend $100,000 on kitchen equipment. This no doubt excludes the small restaurants. Of the twenty people who indicated they were aware of the magazine, only three were small restaurants. Of the ten who receive the magazine, only one was a small restaurant.

5.2.2.4 Stated Intentions

Nonparticipant end users were asked to describe, if they had to replace cooking, refrigeration, or ventilation equipment today, the efficiency level of the equipment they would buy. Would it be standard efficiency, above average efficiency, or very high efficiency? Exhibit 5.25 presents the responses by manufacturer type.

Exhibit 5.25
Efficiency of Equipment if Purchasing



A large percentage of customers state they would buy above average or very high efficiency equipment. The differences by end use are small. For cooking, refrigeration, and ventilation equipment, the percentages of respondents who indicated they would purchase above average or very high efficiency equipment are 76%, 73%, and 64% respectively.

It should be noted that this type of question should have been somewhat more difficult to answer than in some other studies since, of the three end uses, only refrigerators have an efficiency rating. As a result, customers may know relatively little about the price and performance of cooking and ventilation equipment. For example, one might have expected a large number of "don't know" responses. However, that didn't happen. One might also have expected some differences between refrigeration and the other two end uses, but that didn't happen either. Maybe the respondents are better informed since there appears to be active communication between manufacturers and end users regarding the energy use of equipment (see Exhibit 5.14 and Exhibit 5.15). However, based on input from the focus groups and the manufacturer survey, the high level of efficiency that the nonparticipant end users state they would purchase may be exaggerated since they had no cost metric upon which to base their decision. Of course, in general, respondents are not always able to predict their future purchase behavior accurately. Therefore, how much credence should one put in these answers for cooking and ventilation? While this is impossible to accurately determine, it was concluded that there is some measurement error in their responses, though how much is impossible to determine. However, assuming the same level *and* direction of measurement error in some future survey, the comparisons over time of this set of questions should still be reasonably valid.

5.2.2.5 Factors Influencing Decisions

Nonparticipant end users were asked a set of questions about the importance of various factors that can influence their decisions on designs and technology in foodservice construction and renovation projects. They were asked to rate each factor, with a 1 being "not at all important" and a 10 being "very important." It was felt that these were good baseline questions since the FSTC hopes to convince all end users of the value of performance data in equipment-purchase decisions. The extent to which end users are influenced by such factors is an indication of whether they perceive the information as valuable and whether the information is available in the marketplace. Exhibit 5.26 presents the mean end user responses to these questions.

Exhibit 5.26
Factors Influencing End User Decisions

	Mean	**95% CL (+/-)**
How important were professional workshops in shaping a decision or making a recommendation for your most recent projects	5.8	0.65
How important was a demonstration or test conducted by your company in shaping a decision or making a recommendation for your most recent projects	6.3	0.65
How important were utility rebates in shaping a decision or making a recommendation for your most recent projects	6.7	0.61
How important was technical information from your utility representative in shaping a decision or making a recommendation for your most recent projects	6.9	0.57

These results are encouraging. They suggest that end users consider these four factors to be important and that they are receptive to this kind of information. The effect of this is to make the educational mission of the FSTC somewhat less daunting. This also suggests that there are other avenues open for utilities to influence decisions in addition to the FSTC.

5.2.3 Manufacturer

Each question in the manufacturer survey represents baseline data. The reader should refer to Appendix F for the responses to each question. This section summarizes that information in order to get an overall picture of the manufacturers. The sample sizes (11 cooking, 10 refrigeration, and 10 ventilation manufacturers) should be kept in mind when considering these results.

5.2.3.1 Firmographics

As shown in Exhibit 5.27, the evaluation collected data from relatively similar groups of manufacturers based on size of revenue. This was a self-reported variable. The foodservice experts consulted verified that the break down by size of manufacturer were representative of the manufacturer market as a whole.

Exhibit 5.27
Size of Manufacturers

Response	Cooking	Refrigeration	Ventilation
	% of Manufacturer		
Small	18	20	40
Medium	46	60	40
Large	36	20	20
Total	100	100	100

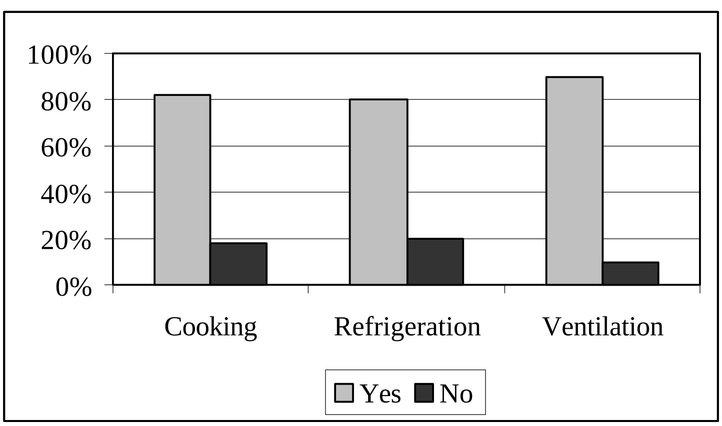
The manufacturers were asked if they manufactured types of equipment other than their specified equipment type. Exhibit 5.28 indicates that most of the manufacturers focus on their specific type of equipment. The refrigeration manufactures create refrigeration-related equipment such as walk-in boxes or ice machines.

Exhibit 5.28
Other Types of Equipment Manufactured

Response	Cooking	Refrigeration	Ventilation
	% of Manufacturer		
No Other Types	55	40	70
Cooking	0	0	0
Refrigeration	9	0	10
Ventilation	9	0	0
Other	27	60	20
Total	100	100	100

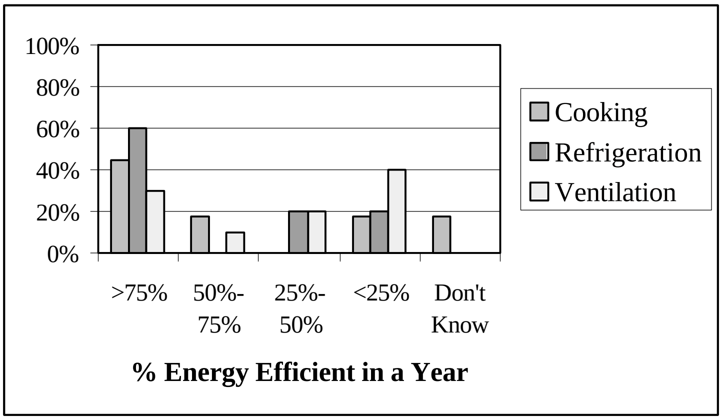
Most of the manufacturers felt they offered energy efficient equipment to their customers, as shown in Exhibit 5.29. However, only a few companies marketed that efficient equipment differently than their other equipment.

Exhibit 5.29
Energy Efficient Option Offered to Customer



Looking at the energy efficient option a slightly different way, when asked what percentage of the equipment manufactured in one year was considered energy efficient, manufacturers stated energy efficient refrigeration products ranked slightly higher than the other two products (shown in Exhibit 5.30).

Exhibit 5.30
Percentage of Product that is Energy Efficient



The market characterization indicates four primary routes between manufacturers and the end users. These routes, specific to end user size, are:

- direct from the manufacturer for large end users,
- through designers for large end users,
- through dealers for large, medium, and small end users, and
- through buying groups for medium end users.

While the data did not allow analysis by end user size, Exhibit 5.31 does show that most manufacturers use dealers as the main link between them and the end user. Of those who stated they deal directly with the end user, 77% have this direct type of relationship only with large chains.

Exhibit 5.31
How Product Gets to End User

Manufacturer Type	Direct	Dealer	Distributor	Designer	Buying Group	Manuf. Rep.
Cooking	64%	91%	36%	9%	27%	27%
Refrigeration	20%	60%	40%	50%	20%	30%
Ventilation	40%	70%	10%	70%	0%	20%
All	42%	74%	29%	42%	16%	26%

5.2.3.2 Linkages

There are 21 linkages in the evaluation model. Linkages 6, 7, 9, 12, 13, and 16 were addressed in the manufacturer survey. Because there is no previous information on the interactions between the FSTC and manufacturers, the data collected on linkages can only be analyzed in terms of the strength of a communication linkage, not a causal linkage. There is no way to determine definitively if the level of linkages seen by the current surveys is due to interactions with the FSTC.

Linkage 6 is the direct interaction between the FSTC and the manufacturers. Exhibit 5.32 shows how many people have heard of the FSTC. Of those who have, Exhibit 5.33 indicates how they heard of the FSTC. The conclusion is that interactions are strong based on the high percentage of manufacturers who have heard of the FSTC. It is especially strong with cooking manufacturers, as 75% of those who have heard of the FSTC (or 55% of all cooking manufacturers) have supplied equipment for testing purposes. Since the FSTC originally focused more on cooking manufacturers and recently has moved to the other product groups, these results are not surprising.

Exhibit 5.32
Manufacturers Who Have Heard of the FSTC

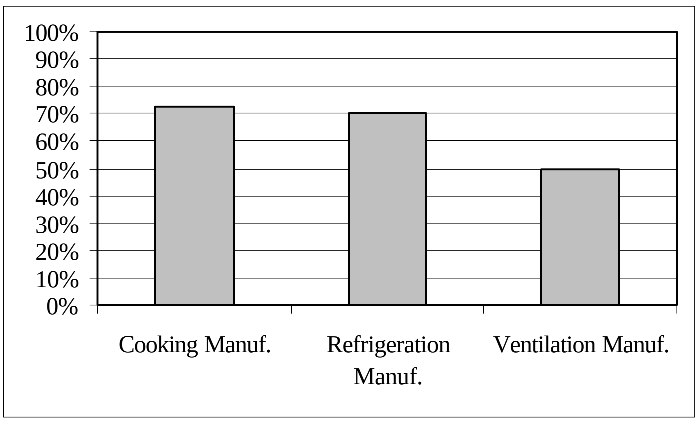
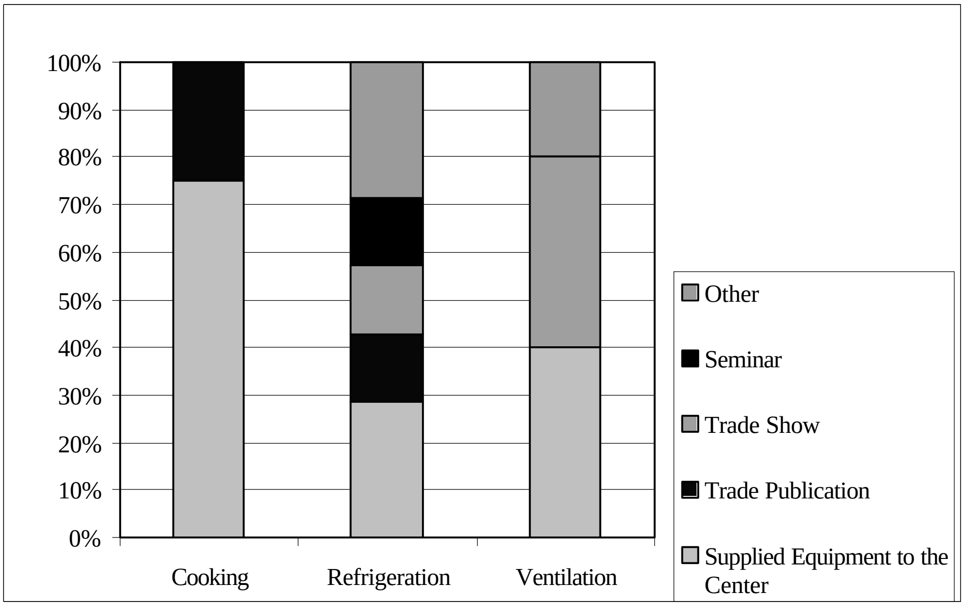


Exhibit 5.33
How Heard of the FSTC



Linkages 7, 9, and 12 deal with interaction with participants and behaviors of participants that may have been seen by the manufacturers. Linkage 16 deals with changes in nonparticipant behaviors that may have been seen by manufacturers. Because there was no way for manufacturers to differentiate between participants and nonparticipants, the information on linkages 7, 9, and 12 also applies to linkage 16.

Exhibit 5.34 shows the product characteristics that cooking, refrigeration, and ventilation equipment manufacturers consider important when selling their equipment. Across all manufacturers, reliability was considered to be most important, with performance a close second. Exhibit 5.35 more directly shows how often manufacturers' representatives recommended energy efficient equipment to their customers. The opposite side of that (the percentage of time that customers requested information about energy efficient equipment) is shown in Exhibit 5.36. The interesting part of these three exhibits is the fact that, while energy efficiency is mentioned as an important feature, it is not always correlated with how often the representatives actually discuss efficiency with their customers. However, based on this information, the manufacturer always presents energy efficiency more often than the customer asks about it.

Exhibit 5.34
Frequency of Responses Mentioned as Features Promoted Most Often by Manufacturers

Response	Frequency
Reliability	19
Performance	11
Energy efficiency	9
Serviceability	7
Options	7
Price	5
Looks	3
Safety	2
Versatility	2
Availability	1
Total	**66**

Exhibit 5.35
Percentage of Time That Manufacturers' Representatives Recommend Energy Efficient Equipment to Customers

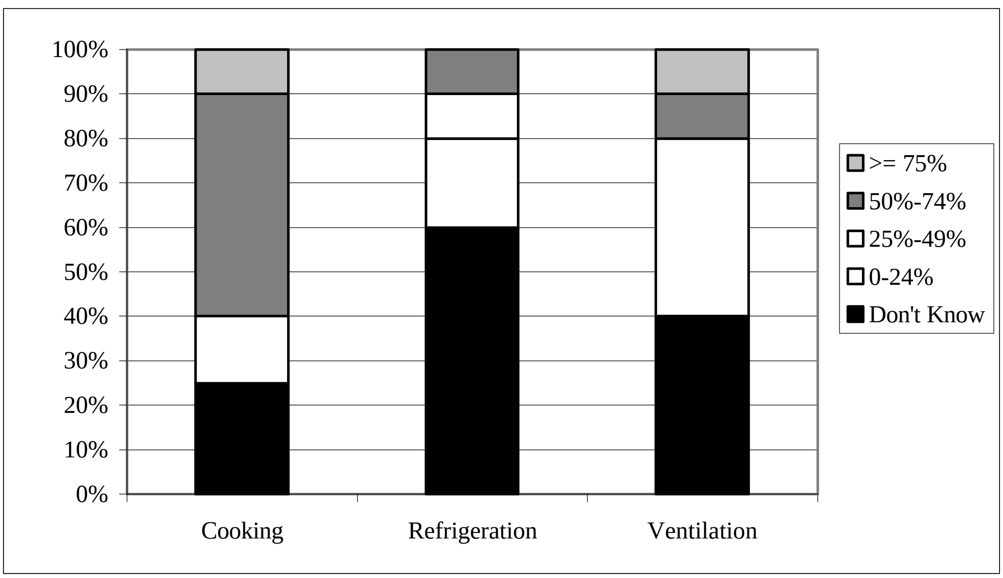


Exhibit 5.36
Percentage of Time Customers Ask Manufacturers' Representatives About Energy Efficiency

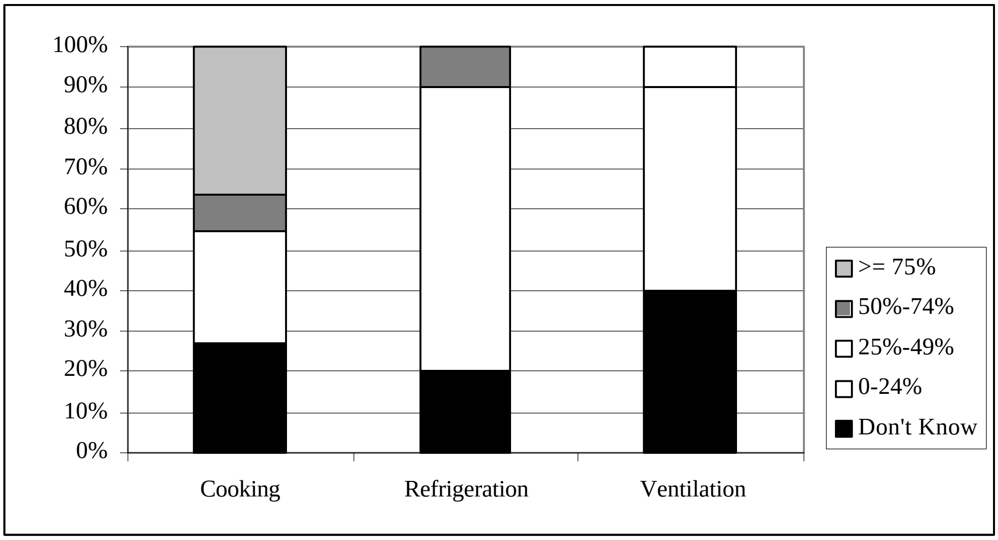
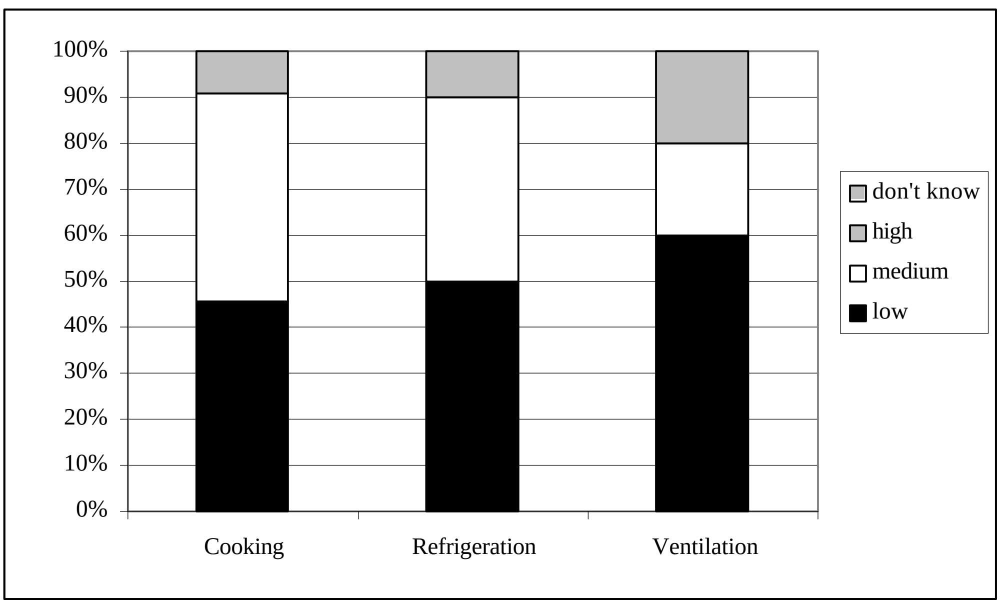


Exhibit 5.37 indicates, from the manufacturers' viewpoint, the level of priority customers give to energy efficiency when purchasing equipment. It is considered a high priority only for a small percentage of the customers, regardless of which type of equipment they may be purchasing.

Exhibit 5.37
Priority Customers Give Energy Efficiency When Making Purchase Decisions



The conclusion for linkages 7, 9, and 12 is that efficiency information does pass between manufacturers and customers, although the communication link is weak.

Linkage 13 deals with whether the ASTM had an effect on manufacturers of cooking equipment. The majority of cooking manufacturers (73%) was at least somewhat aware of ASTM testing methods, as shown in Exhibit 5.38. Of the respondents that were aware of the ASTM, about half reported they often used the ASTM test methods in their manufacturing processes(Exhibit 5.39). Only one of the respondents indicated that their customers ever asked how a particular piece of equipment scored using ASTM methods. The conclusion is that a moderate communications link between the ASTM and manufacturers does exist, as exhibited by the high level of awareness of ASTM.

Exhibit 5.38
Degree To Which Cooking Manufacturers Are Aware of ASTM Methods

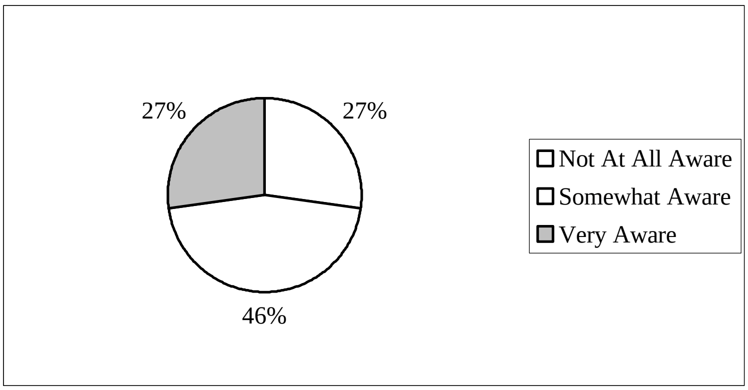
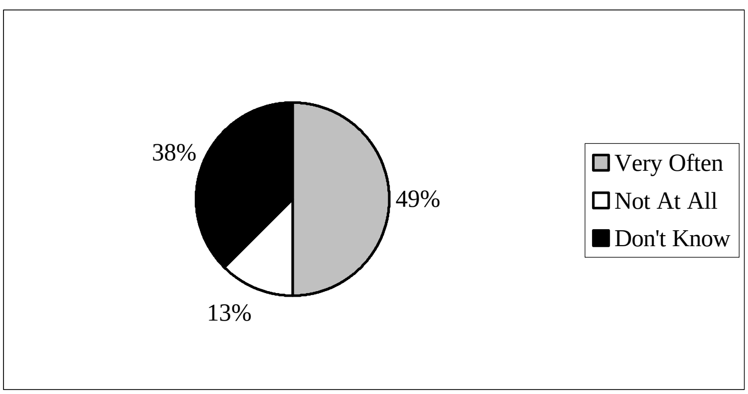


Exhibit 5.39
Degree To Which Cooking Manufacturers Actively Incorporate ASTM Methods in Their Manufacturing Processes



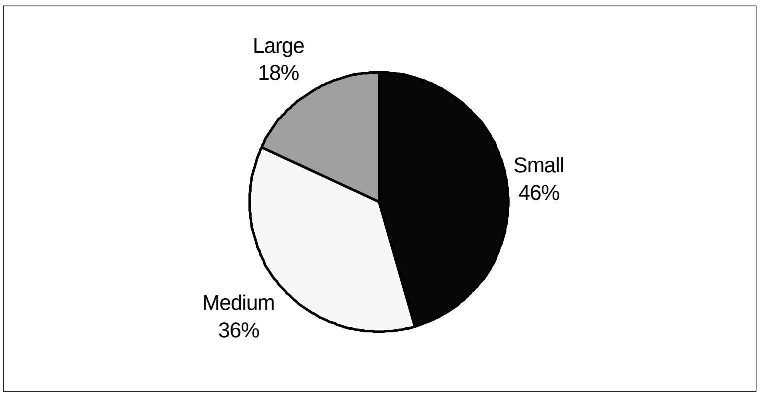
5.2.4 Designer

As with the manufacturer surveys, each question in the designer survey represents baseline data. The reader should refer to Appendix E for the responses to each question. This section summarizes that information in order to provide an overall picture of the designers. Again, the sample size (11) should be kept in mind when considering this data.

5.2.4.1 Firmographics

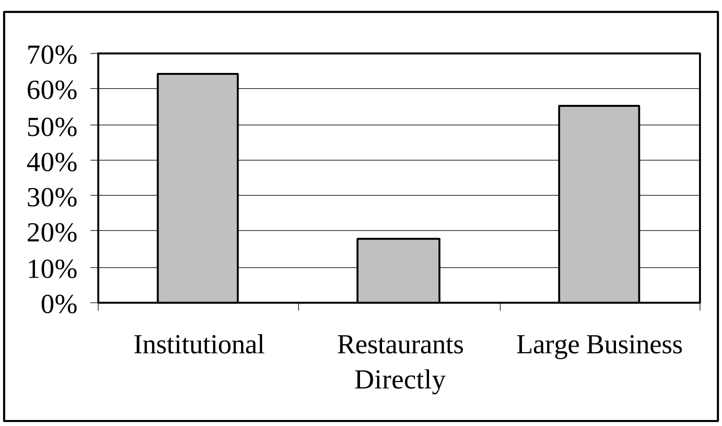
The designers surveyed represented a spectrum of company revenue size, as shown in Exhibit 5.40. The large designers may be slightly over-represented in the evaluation surveys, as the industry expert felt that only about 15% of the kitchen designers are large.

Exhibit 5.40
Size of Designers



The designers in the survey work with many types of customers. As shown in Exhibit 5.41, the majority work for institutional customers (i.e., schools, hospitals, correctional centers). Very few of the designers interviewed work directly with restaurants and over half work with large businesses such as food processing, convention centers, or hotels. The evaluation team industry expert commented that this distribution is very typical for the industry. Most restaurants work directly with dealers to design kitchens. Only high-end restaurants or large businesses (including chains) have the resources to hire

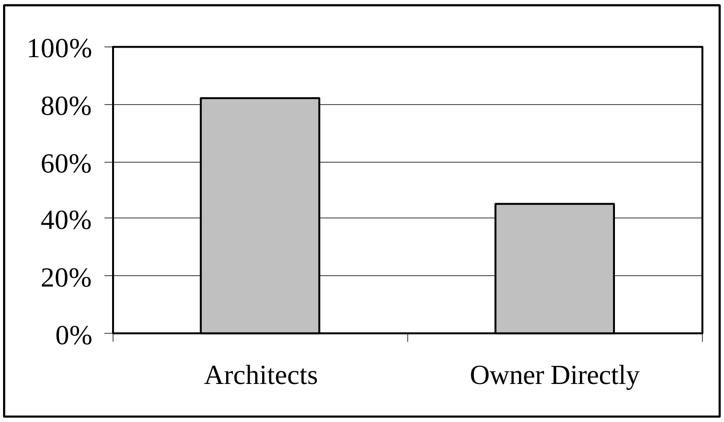
Exhibit 5.41
Type of Customers



designers. Institutions, because they have little in-house expertise and often bid out construction, also rely heavily on the design community.

The designers we surveyed work almost entirely as subcontractors for architects(Exhibit 5.42). A little less than half work directly with an owner, with some designers working with either architects or owners, depending on the job.

Exhibit 5.42
Designers' Clients



All the designers sought out information on energy efficiency or production efficiency from the manufacturers, either from manufacturer literature or directly from the representative. One of the designers uses *Foodservice Equipment report*s as a source of information.

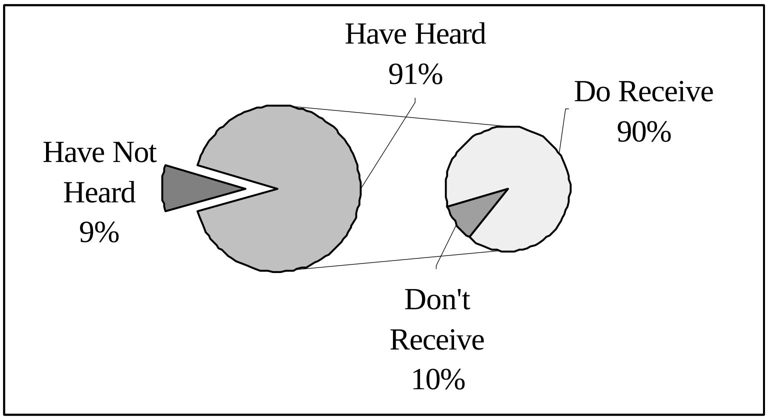
5.2.4.2 Linkages

There are 21 linkages in the evaluation model. Linkages 6, 7, 9, 12, 13, 14, and 16 were addressed in the designer survey. As with the manufacturer surveys, the relative strengths of these linkages are in terms of a communication linkage, not a causal linkage.

Linkage 6 is the direct interaction between the FSTC and the designers. The interactions appeared high based on the percentage of designers who have heard of the FSTC (64%). However, the questions that asked how many times they had contacted the FSTC or been contacted by them reveal how few actual interactions have occurred. Only 14% of those who had heard about the FSTC had actually been contacted by the FSTC or had contacted the FSTC. Twenty-seven percent of the designers knew Bettie Ferlin Davis (the original PG&E manager) or knew about the FSTC since it began. This indicates that, while they know about the FSTC, they don't actively use it as a source of information. Over 70% of the designers heard about the FSTC from others in the industry, while the remaining 30% heard about it from a trade publication.

An indirect route of FSTC and designer interaction is through a trade publication. Ten of eleven designers (91%) had heard of *Food Service Equipment reports*, and of those ten, nine (90%) receive it (Exhibit 5.43). The conclusion is that designers have a weak communication linkage with the FSTC, even though many know about it.

Exhibit 5.43
Percentage of Designers Who Have Heard Of and Receive *Food Service Equipment reports*



Linkages 7, 9, 12 and 16 deal with changes in participant and nonparticipant behaviors that may have been seen by the designers. One source of information on this is question 8 ("Our customers never request information on energy efficiency"). The assumption is that if the customers' awareness or attitudes have been changed, they would frequently ask about energy efficiency. The average answer for this question was 6.0 ± 1.2, indicating that the designers agreed with this statement, but only slightly. The conclusion is that customers don't request information on energy efficiency (or at least not very often) and that the communication linkages are weak. Of course, there is no way to determine, based on this single question, whether the customer awareness has been affected by the FSTC.

The responses to Questions 44-49 ("How often have you discussed the energy efficiency of different types of equipment with your customers and how often have they asked?") spoke more directly to this issue. Of the eleven designers interviewed, only one indicated he had never discussed energy efficiency with his customers. The designers always felt they presented information on energy efficiency more often than their customers requested it (Exhibit 5.44). It is interesting to note that designers seemed to discuss energy efficiency of ventilation systems more often than they discussed the efficiency of cooking or refrigeration systems. When asked to identify the top factors that influence their customers' purchases, only one designer mentioned energy efficiency (Exhibit 5.45). This is reinforced by Exhibit 5.46 which shows that designers believe energy efficiency is of low importance to their customers.

Exhibit 5.44
Discussions on Energy Efficiency By End Use

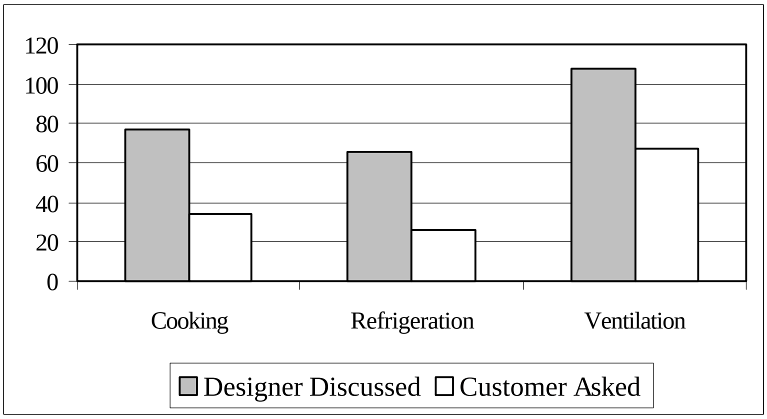
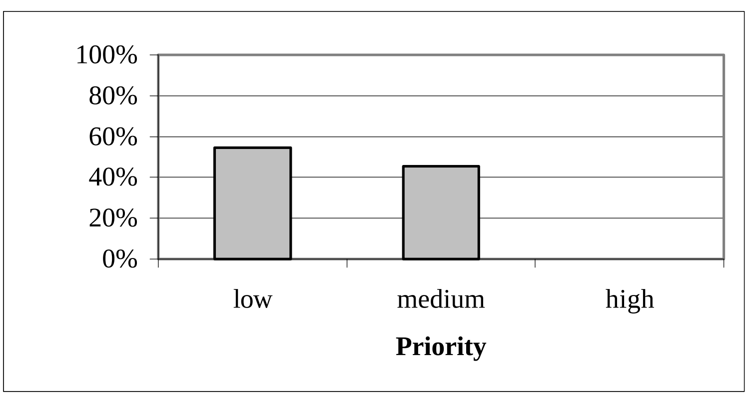


Exhibit 5.45
Top Factors Which Influence End user Purchase Decisions, As Reported By Designers

Response	Frequency
First Cost	7
Specific Brand	5
Serviceability	4
Suitability for the Task	3
Durability	3
Efficiency	1

Exhibit 5.46
Priority Customers Give to Energy Efficiency When Making Purchasing Decisions, As Reported by Designers

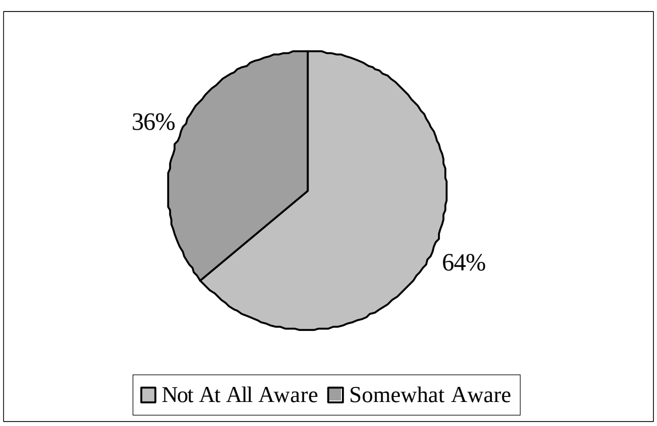


Question 27 ("Do you know anyone in the restaurant business who has ever attended an activity at the Center?"), while not originally indicated as a question revealing interactions between the designers and end users, appears to get at some of this information. Fourteen percent of the designers knew someone who had attended an activity at the FSTC and knew the person was impressed with it. This indicates a very weak communication linkage between the FSTC and the customer that may be reflected back to the designer through their interaction with the customer. The response to this question connects the FSTC, customer, and designer in a triangular flow of information.

Linkage 13 deals with the interaction between the designers and the ASTM. Most of the designers have heard about the ASTM (82%). Of that 82%, 20% heard about the ASTM from manufacturers, 30% from trade shows, and 50% from other sources. This information relates to equipment specifications and is broader than just the information on cooking efficiency tests. The designers have used ASTM information for many years (2 of the 11 stated they have known about the ASTM for 30 years). It was unanimous, though, as to direct interaction between the ASTM and the designers – there are none. None of the 82% who had heard of the ASTM ever contacted the ASTM, nor had they ever been contacted by the ASTM. The conclusion is that the ASTM has no direct connection with designers, although information distributed by the ASTM is often used by designers.

A slightly different approach to designer interaction with the ASTM dealt with the ASTM's standard test methods on kitchen equipment. As shown in Exhibit 5.47, 64% of the designers had never heard of the test methods, while 36% were somewhat aware of them. Of those 36%, 50% heard about the test methods from publications, 25% from architects and engineers, and 25% did not remember from whom they heard about the test methods. None of the designers had ever provided information from ASTM test methods to customers. The conclusion is that designers obtain the best information about these test methods from publications, although it is a weak communication linkage. This is interesting in light of the fact that 82% of the designers receive the *Foodservice Equipment reports* magazine, where results of these testing methods are often provided.

Exhibit 5.47
Designer Awareness of ASTM Test Methods



Linkage 14 deals with interaction between designers and manufacturers. Designers were asked how many times they had discussed energy efficiency with refrigeration, cooking, and ventilation manufacturers. On average, designers had discussed energy efficiency with manufacturers about fifteen times over the last few years, split fairly evenly between cooking, refrigeration, and ventilation manufacturers. There was a good deal of variation in individual answers, with two designers stating they had never discussed energy efficiency with a manufacturer, and one at the opposite end of the spectrum who reported having discussed energy efficiency with manufacturers a total of forty-two times. The conclusion is that there is a moderate communications linkage between designers and manufacturers, although it is not universal.

5.2.5 Barriers

One goal of the evaluation was to determine the current status of six potential market barriers. This section focuses on market barriers (see Section 3.4 for a description of each of the barriers) for end users, manufacturers, and designers. The data are presented by market actors and also across market actors in order to see which barriers are the most prevalent. There is no FSTC participant survey information presented here since those surveyed do not represent the end user population. The nonparticipant end user survey was used to determine the potential barriers seen by end users.

For each end use (cooking, refrigeration, and ventilation), respondents were asked to react to a series of statements regarding market barriers on a scale of 1 to 10, with a 1 being "strongly disagree" and a 10 being "strongly agree." The higher the number the more substantial the barrier.

5.2.5.1 End users

On the nonparticipant end user survey, seven questions were asked in an attempt to measure the organizational practices market barrier. Exhibit 5.48 through Exhibit 5.58 present the results of the specific questions, with Exhibit 5.59 providing a graphical summary of the results of all the barriers.

For the organizational practices barrier, note that scoring of the third item in Exhibit 5.48 has been reversed to make it consistent with the other six so that a high score translates into a high market barrier.

Exhibit 5.48
Size of Market Barrier: Organizational Practices

	Mean	95% CL (+/-)
Our practice is not to worry about equipment unless it breaks down.	4.6	0.71
When we select equipment, the most important consideration is immediate delivery.	6.5	0.63
Our company includes the long run operating and maintenance costs of equipment in its initial calculations.	2.5	0.53
When we select our equipment, the most important issue is its initial cost.	6.9	0.59
The most important operational issue for our company is keeping our foodservice costs under control.	9.0	0.35
Investing extra money in energy efficient equipment would reduce our ability to take advantage of other investment opportunities.	6.0	0.65
I don't see any reason to be proactive with regard to energy efficiency in today's economy.	4.1	0.67

End users' perceptions of the organizational practice market barrier seem reasonably low. The factor analysis indicated that the loading of the third item regarding the inclusion of long-run operating and maintenance cost was below the established threshold (see Appendix H for details) for inclusion and was therefore dropped from the scale. Thus, the mean of all items forming the organizational practices scale is 6.2, which means that there is general agreement that this is a moderately high barrier at this point in time.

The next set of tables address performance uncertainty for each of the three end uses. The answers to the three questions for each end use are presented in Exhibit 5.49, Exhibit 5.50, and Exhibit 5.51.

Exhibit 5.49
Size of Market Barrier: Performance Uncertainty for Cooking

	Mean	95% CL (+/-)
When we select cooking equipment, the most important thing we look for is reliability of operation.	8.8	0.39
The return on investment from energy efficient cooking equipment is difficult to estimate.	7.3	0.59
Our company is unwilling to take the risks involved in the use of high efficiency cooking equipment.	4.7	0.67

Exhibit 5.50
Size of Market Barrier: Performance Uncertainty for Refrigeration

	Mean	95% CL (+/-)
When we select refrigeration equipment, the most important thing we look for is reliability of operation.	9.1	0.29
The return on investment from energy efficient refrigeration equipment is difficult to estimate.	7.4	0.55
Our company is unwilling to take the risks involved in the use of high efficiency refrigeration equipment.	4.5	0.63

Exhibit 5.51
Size of Market Barrier: Performance Uncertainty for Ventilation

	Mean	95% CL (+/-)
When we select ventilation equipment, the most important thing we look for is reliability of operation.	8.9	0.39
The return on investment from energy efficient ventilation equipment is difficult to estimate.	7.6	0.59
Our company is unwilling to take the risks involved in the use of high efficiency ventilation equipment.	4.5	0.69

Two important conclusions can be drawn from these three exhibits. First, the barrier is reasonably high for all three end uses. Second, the magnitude of the barrier is essentially the same across all three end uses, a conclusion that was supported by the factor analysis. The mean for all nine questions that addressed the market barrier of performance uncertainty is 7.0.

In the end user questionnaire, two questions were asked regarding split incentives. Exhibit 5.52 presents the responses to these questions.

Exhibit 5.52
Size of Market Barrier: Split Incentives

	Mean	95% CL (+/-)
The operational costs savings from installing energy efficient equipment would not flow into my departments budget.	4.6	0.65
The people who have to make the investments in energy efficient equipment for our company are not the same ones who would see the benefits in lower operating costs.	4.4	0.73

In general, end users perceive this barrier to be relatively low. The overall mean is 4.5.

The next set of tables addresses information-search costs for each of the three end uses. The answers to the three questions for each end use are presented in Exhibit 5.53, Exhibit 5.54, and Exhibit 5.55.

Exhibit 5.53
Size of Market Barrier: Information/Search Costs for Cooking

	Mean	95% CL (+/-)
Our company has the expertise to evaluation the performance of our cooking equipment.	3.0	0.63
It's hard to figure out which cooking equipment to buy because of all the technical information you have to find.	5.4	0.71
It's hard to get a handle on the benefits of energy efficient cooking equipment without a detailed written analysis.	7.1	0.63

Exhibit 5.54
Size of Market Barrier: Information/Search Costs for Refrigeration

	Mean	95% CL (+/-)
Our company has the expertise to evaluation the performance of our refrigeration equipment.	3.2	0.61
It's hard to figure out which refrigeration equipment to buy because of all the technical information you have to find.	5.4	0.69
It's hard to get a handle on the benefits of energy efficient refrigeration equipment without a detailed written analysis.	7.0	0.61

Exhibit 5.55
Size of Market Barrier: Information/Search Costs for Hoods

	Mean	95% CL (+/-)
Our company has the expertise to evaluation the performance of our ventilation equipment.	3.5	0.67
It's hard to figure out which ventilation equipment to buy because of all the technical information you have to find.	5.8	0.69
It's hard to get a handle on the benefits of energy efficient ventilation equipment without a detailed written analysis.	7.0	0.65

Again, little difference is seen across the three end uses. The overall mean for this barrier is 5.2, which is the second lowest perceived barrier, with almost as many respondents agreeing with these statements as disagreeing.

The next set of tables address asymmetric information for each of the three end uses. The answers to the three questions for each end use are presented in Exhibit 5.56, Exhibit 5.57, and Exhibit 5.58

Exhibit 5.56
Size of Market Barrier: Asymmetric Information for Cooking

	Mean	95% CL (+/-)
Cooking equipment sales people usually just try to push the products of whatever manufacturer they're closest to.	6.9	0.65
Cooking equipment dealers and representatives use the desire for high-efficiency equipment by customers like us to charge more than it's really worth.	6.5	0.63
I think much of what salesmen for cooking equipment tell us about the performance of high efficiency cooking equipment is exaggerated.	6.0	0.57

Exhibit 5.57
Size of Market Barrier: Asymmetric Information for Refrigeration

	Mean	95% CL (+/-)
Refrigeration equipment sales people usually just try to push the products of whatever manufacturer they're closest to.	7.0	0.63
Refrigeration equipment dealers and representatives use the desire for high-efficiency equipment by customers like us to charge more than it's really worth.	6.5	0.61
I think much of what salesmen for refrigeration equipment tell us about the performance of high efficiency cooking equipment is exaggerated.	5.8	0.57

Exhibit 5.58
Size of Market Barrier: Asymmetric Information for Hoods

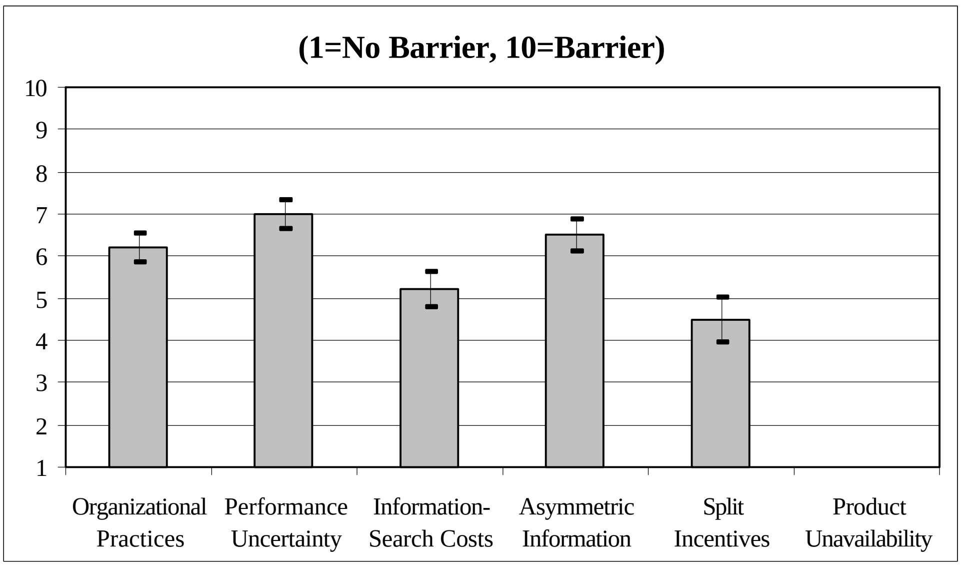
	Mean	95% CL (+/-)
Ventilation equipment sales people usually just try to push the products of whatever manufacturer they're closest to.	7.0	0.65
Ventilation equipment dealers and representatives use the desire for high-efficiency equipment by customers like us to charge more than it's really worth.	6.2	0.65
I think much of what salesmen for ventilation equipment tell us about the performance of high efficiency cooking equipment is exaggerated.	6.0	0.59

Once again, little difference is seen across the three end uses. The overall mean for this barrier is 6.5, which is the third highest perceived barrier.

5.2.5.2 Summary

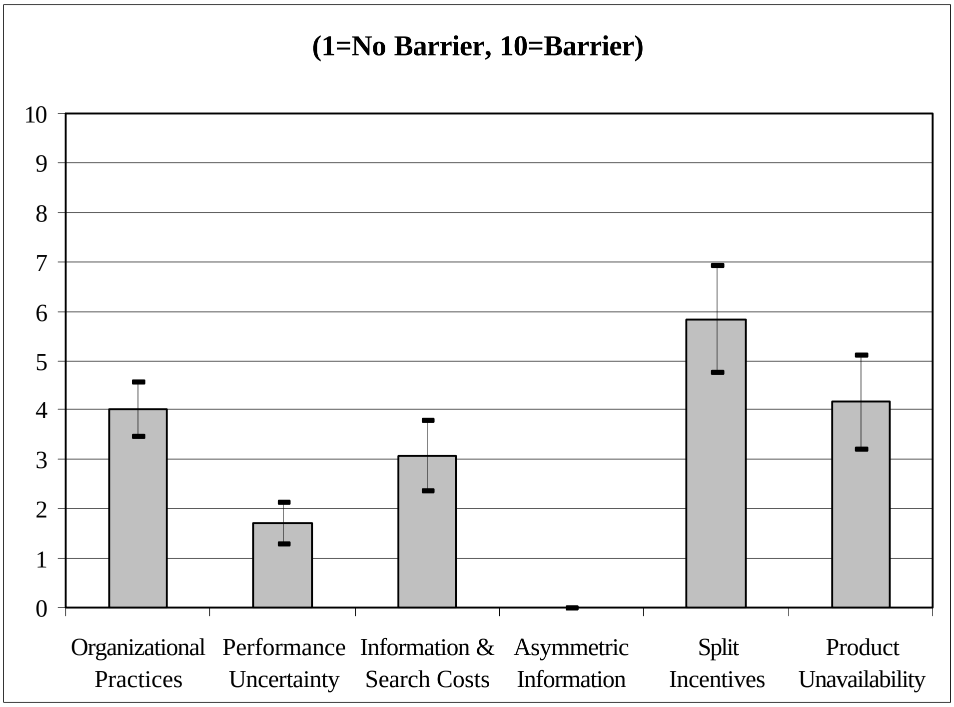
For the nonparticipant end users, as shown in Exhibit 5.59, the largest barrier is performance uncertainty. That asymmetric information is the next highest barrier seems to make some sense, since sales staff may exaggerate the performance claims of the equipment. It is a little surprising that the information-search costs barrier is so much lower than performance uncertainty, since information should reduce performance uncertainty. One explanation is that while information may be readily available, performance information is not often provided or, when it is provided, the customer does not find it credible. Questions on product unavailability were not asked of this group.

Exhibit 5.59
Barriers for End Users



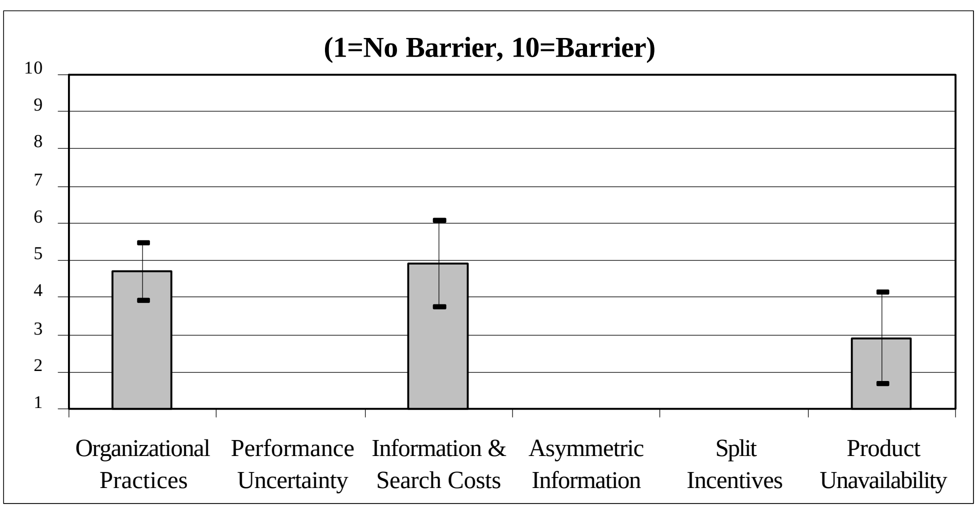
The largest barrier, as seen by the manufacturers and shown in Exhibit 5.60, is that of split incentives. The customer who makes the decision on a piece of equipment is not the person who would see any benefits in operating or maintenance costs. There were no questions asked about asymmetric information.

Exhibit 5.60
Potential Barriers for Manufacturers



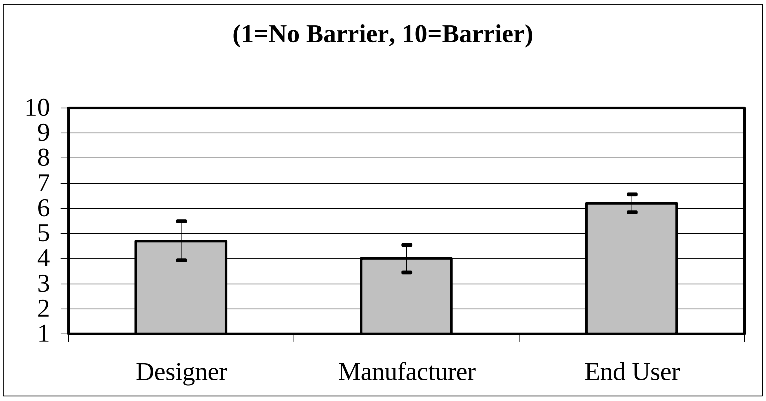
As one can see from Exhibit 5.61, designers do not seem to feel that there are barriers to energy efficiency based on the questions directed to the three potential barriers.

Exhibit 5.61
Potential Barriers for Designers



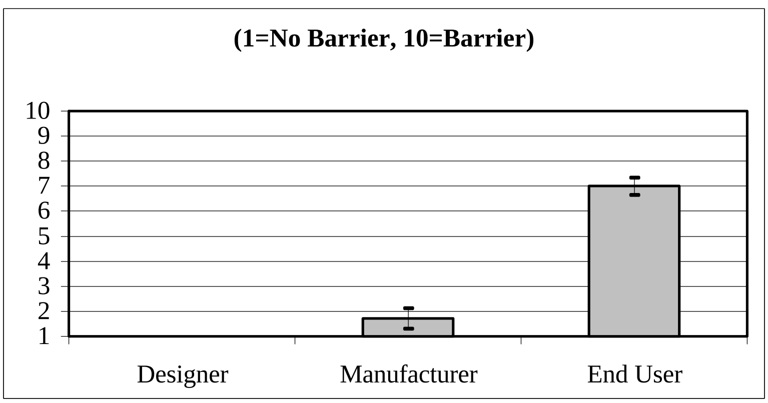
As shown in Exhibit 5.62, end users perceive organizational practices as more of a barrier than either designers or manufacturers.

Exhibit 5.62
Organizational Practices



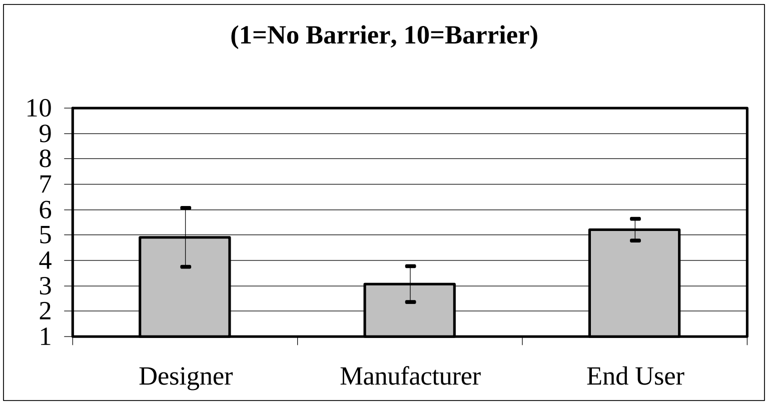
The designers were not asked any questions regarding performance uncertainty. There is a big difference, though, in how the manufacturer and end user perceive the performance of energy efficient equipment (shown in Exhibit 5.63).

Exhibit 5.63
Performance Uncertainty



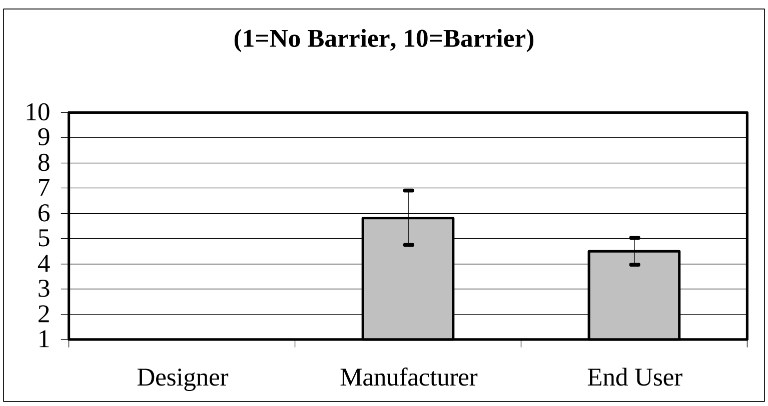
Designers and end users perceive information to be harder to obtain on energy efficiency than manufacturers. However, it does not appear to be a large barrier.

Exhibit 5.64
Information & Search Costs



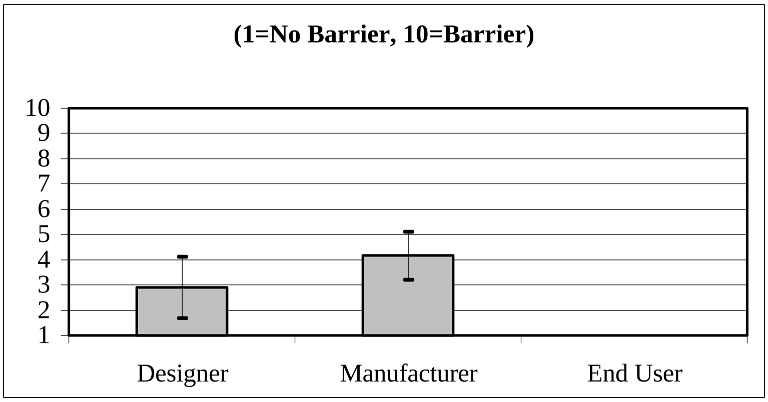
Again, designers were not asked questions on split incentives. This barrier is perceived to be higher by the manufacturers than the end users, although the confidence intervals overlap slightly and may indicate a non-significant difference.

Exhibit 5.65
Split Incentives



End users were not asked about product unavailability. Neither manufacturers nor designers considered this a potential barrier to energy efficiency.

Exhibit 5.66
Product Unavailability



5.3 Measurement of Market Effects

This section covers the measurement of market effects required under Research Objectives 6 and 7. The measurement of market effects and linking them to market barriers will be presented in terms of the 11 hypotheses presented in Section 3.5. Exhibit 5.67 shows the summary of each of the market effects by hypothesis. Detailed information reinforcing the assessed market effects follows.

Exhibit 5.67
Summary of Market Effects by Hypothesis

Hypothesis	Market Effect				
	No Effect	**Weak**	**Mod-erate**	**Strong**	**Unable to Assess**
Participants					
#1a. FSTC activities will cause participants to experience an increase in awareness toward energy efficient cooking, refrigeration, and ventilation equipment.			✓		
#1b. FSTC activities will cause participants to experience a more positive attitude toward energy efficient cooking, refrigeration, and ventilation equipment.	✓				
#2. The FSTC will reduce select market barriers for FSTC participants.			✓		
#3. FSTC activities will cause participants to increase the extent to which they share information about energy efficient technologies.		✓			
#4. FSTC activities will cause participants to increase the extent to which they require performance data when assessing products for installation.			✓		
#5. FSTC activities will cause participants to increase the extent to which they purchase energy efficient equipment.			✓		
Nonparticipants					
#6. FSTC activities will cause nonparticipants to increase the extent to which they require performance data when assessing products for installation.					✓
#7. FSTC activities will cause nonparticipants to increase the extent to which they purchase energy efficient equipment.					✓
Manufacturers					
#8. The FSTC activities will increase in the extent to which manufacturers use FSTC test data.					✓
#9. The FSTC activities will increase in the extent to which manufacturers use standardized test methods to develop new equipment.		✓			
Designers					
#10. The FSTC activities will increase in the extent to which designers request performance data		✓			
#11. The FSTC activities will increase in the extent to which designers recommend energy efficient equipment					✓

5.3.1 Participant

5.3.1.1 Participant Characterization

Participant characteristics are presented prior to presenting the results of the market effects. The characteristics of the nonparticipant end users were presented in Section 5.2.2. One should keep the differences between these two groups in mind when reviewing the results of the first five market effects hypotheses.

The characteristics of the FSTC participants in Exhibit 5.68 through Exhibit 5.71 provide this information.

Exhibit 5.68
Service Style

	Frequency	Percent
Full-Service	14	61
Quick Service	9	39
Total	23	100

Of the 21 restaurants in the two service-style categories, 61% consider themselves full-service versus 39% who consider themselves quick- service. That 13 respondents could not place their restaurant into one of these two categories suggests that the definitions of full-service and quick-service are ambiguous.

Exhibit 5.69
Size of Site

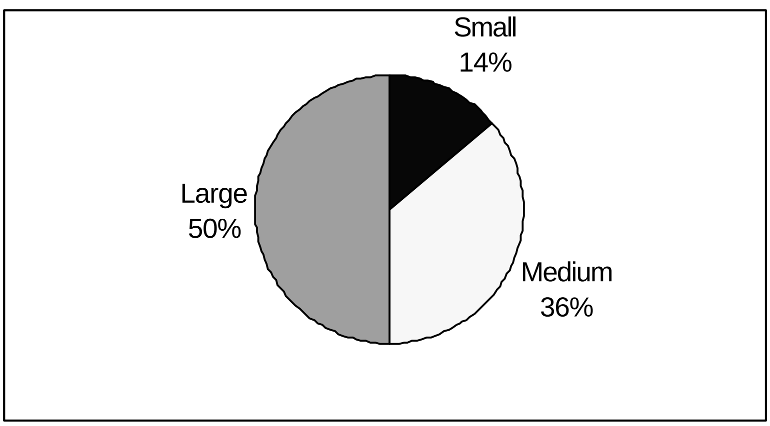


Exhibit 5.70
Number of Full-Time Employees

	Frequency	Percent
1 to 4	9	25
5 to 10	6	17
11 to 30	7	19
31 to 60	11	31
> 60	3	8
Total	36	100

Fully one half of the participants consider themselves to be large restaurants, with another 36% who consider themselves to be medium-sized restaurants. Compared to the size distribution of the nonparticipant end users, the participant medium-sized and large restaurants are over-represented. Responses to the size question seem reasonably consistent with the number of full-time employees reported.

Exhibit 5.71
Number of Other Sites in California

	Frequency	Percent
No Other Sites	11	31
1-10 Other Sites	6	17
11-20 Other Sites	8	22
21-40 Other Sites	4	11
> 40 Other Sites	7	19
Total	36	100

Thirty-one percent of the participants report no other sites in California, with 69% having at least one other site.

The next section describes the results for hypotheses #1 through #5, which are concerned with the short-term impacts of the FSTC on participants. These results are, in some cases, based on an analysis of information provided by participants, while in other cases the analysis is based on a comparison of information provided by both participants and nonparticipants. When based only on information provided by participants, the results are very tenuous. When based on a comparison of participants and nonparticipants, confidence in the conclusions is increased. However, even here it must be understood that this is a static comparison group design, which cannot control for each group's baseline and any bias due to self-selection. The result of a single statistical test cannot be completely relied upon. Rather, conclusions about market effects will be based upon the preponderance of evidence.

Finally, the 36 participants interviewed were exposed to a variety of information. Exhibit 5.72 presents the topics covered in the FSTC training.

Exhibit 5.72
Information Acquired from the FSTC

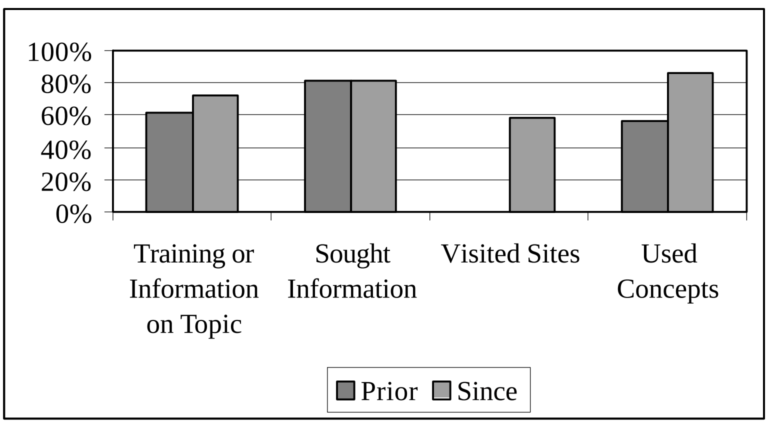
	Frequency	Percent of Responses	Percent of Respondents
Cooking Equipment	29	39	81
Hood Equipment	25	33	69
Refrigeration Equipment	21	28	58
Other Equipment	2	3	6
Total	75	100	208

5.3.1.2 Hypothesis #1: Participant Awareness and Attitude

The hypothesis being tested here is whether the FSTC caused any increases in participant attitudes, knowledge, or awareness of energy efficient cooking, hood, or refrigeration equipment (Linkages #1 and #19). Recall that this hypothesis was tested using two approaches. The first used the self-reports of participants about what they learned from the FSTC. The second approach involved a comparison of participants and nonparticipant end users with respect to attitudes toward energy efficiency and awareness of performance testing.

Knowledge - From Exhibit 5.73, one can see that 61% of the participants had received prior training on the topics covered at the FSTC.

Exhibit 5.73
Knowledge Prior and Since FSTC Interaction



Eighty percent of the participants sought information on the topics covered both prior to and since visiting the FSTC. While the participants appear to have been active learners prior to their FSTC experience, only slightly more than 55% had actually used these concepts, skills, and technologies prior to their FSTC experience.

Also, since visiting the FSTC, more than 72% of the participants have sought additional information or services from the FSTC related to the topics covered at the FSTC. This is clearly significant and indicates the value participants attach to the information and services provided by the FSTC.

Since attending the FSTC activity, slightly more than 58% have visited or talked with personnel at sites where the concepts and technologies have been implemented. An important question is whether, after the FSTC activity, a greater percentage actually used the concepts and technologies learned at the FSTC. Exhibit 5.73 shows that after the FSTC experience, 86% actually used the concepts and technologies. This represents a 30.4 percentage point increase over the 55.6% who reported they had used the concepts and technologies *prior* to visiting the FSTC.

To test whether this difference is statistically significant, a test of the difference between two correlated proportions (Guilford and Fruchter, 1973) was performed. The resulting z value of 3.1 was statistically significant at beyond the 0.01 level (indicating the increase in using concepts is significant). In addition, 81% indicated that they plan to use some of the concepts and technologies learned at the FSTC in the future.

Attitudes - A comparison was made between the participants and nonparticipant end users on attitudes toward energy efficiency. The mean of the five attitude questions for participants was compared to the mean of the five attitude questions for the nonparticipant end users. First, a simple t-test was used to compare the two groups using the attitude scale. The mean of the participants group was 7.0 while the mean of the nonparticipant end users was 7.7. The difference between these two means was statistically significant at the 96% confidence level (t value of 2.07).

However, when a regression model was used to control statistically for variables on which the two groups are different (e.g., number of employees and the number of other California sites), this difference in attitudes was <u>not</u> statistically significant[9]. That is, after holding these variables *constant*, the relationship between group membership and attitudes was no longer statistically significant. The detailed results, including estimated coefficients and regression diagnostics are presented in Appendix H.

Awareness - When participants and end users were asked whether they had ever heard of the ASTM, a greater percentage of participants reported that they had heard of the ASTM. A chi square test revealed that this difference was statistically significant. However, while a statistically significant chi square indicates that the observed frequencies are different, it reveals nothing about the strength of the relationship between being a participant or an end user and awareness of the ASTM. The strength of this relationship, as measured by a variety of statistics such as the uncertainty coefficient, was weak.

The preponderance of the evidence indicates a moderate positive impact of the FSTC on the knowledge and awareness of participants and no influence on attitudes.

---

[9] Statistical control means that one uses statistical methods to identify, isolate, or nullify variance in the dependent variable that is presumably "caused" by one or more independent variables that are extraneous to the particular relation or relations under study. Variables left uncontrolled, such as number of employees and the number of other California sites, can often lead to spurious correlations. After controlling for other variables, the original relationship may be smaller or larger. Thus, to clearly see the relationship of group membership to attitudes, one first partial out or control for the effects of the other potentially confounding variables.

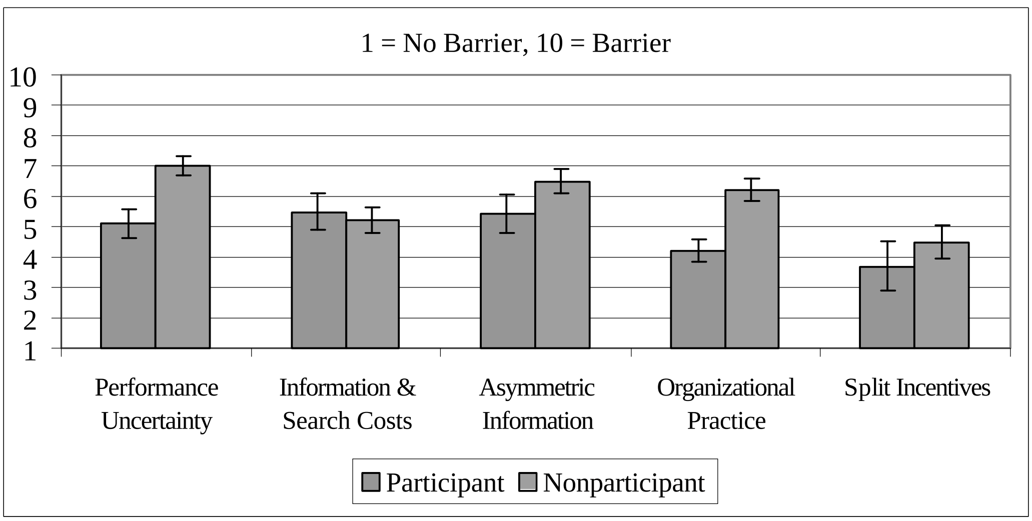
5.3.1.3 Hypothesis #2: Market Barriers

Of the five market barriers examined for the participant and nonparticipant end users, statistically significant differences at the 0.05 level were found on three:

- organizational practices
- performance uncertainty
- asymmetric information

Based on three of the five assessed barriers (shown in Exhibit 5.74) indicating a significant difference between participants and nonparticipants (with the barriers lower for the participants) and taking into account the type of analysis used, this is considered evidence of a moderate market effect. The detailed results, including estimated coefficients and regression diagnostics for each of the barriers, are presented in Appendix H.

Exhibit 5.74
Participant and Nonparticipant Barriers



5.3.1.4 Hypothesis #3: Share Information

The responses to questions 58, 59, 62, and 63 on the participant survey are presented in Exhibit 5.75.

Exhibit 5.75
Communication and Use of Ideas Learned at the FSTC

	Mean	95% CL (+/-)
Passed on material obtained from the Center to others	15.2	16.3
Used technical data from the Center to support a decision	9.3	11.0
Suggested or insisted that a partner or contractor incorporate ideas learned at the Center	5.9	5.5
Discussed ideas presented at the Center with a manufacturer or manufacturer's representative to encourage product change	6.8	3.3

While the means in Exhibit 5.75 seems quite large, one should keep in mind that the 95% confidence intervals surrounding these means are quite large for three of the questions.

Two additional questions (Q55 and Q56) were asked of both participants and nonparticipant end users regarding the sharing of ideas about energy efficiency in general with colleagues, and the use of these ideas in shaping internal policies and practices. The mean of the questions for participants was compared to the mean of the questions for the nonparticipant end users. A simple t-test was used to compare the two groups on these two questions. For the first question, the mean of the participants group was 11.2, while the mean of the nonparticipant end users was 3.9. The t value of 2.3 was statistically significant ($p=0.03$). For the second question, the mean of the participants group was 6.1, while the mean of the nonparticipant end users was 4.1. The t-value was not statistically significant.

After controlling for the compositional differences, the difference for the first question was mildly significant ($p=0.08$) and the difference for the second question continued not to be statistically significant ($p=0.78$). It is assumed that there is a weak market effect. The detailed results, including estimated coefficients and regression diagnostics, are presented in Appendix H.

5.3.1.5 Hypothesis #4: Require Performance Data

There were three questions that addressed how many times participants and nonparticipants asked their dealer, manufacturer, sales representative, or designer about equipment that saves energy. There was one question for each end use. A fourth question asked the respondent whether he or she ever asked their dealer about how specific pieces of equipment scored on performance tests that used standard test methods. The first three questions were examined using t-tests and regression analysis, while the fourth was examined using the chi-square technique.

Equipment - There was a significant difference between the participants and nonparticipants in how many times they asked about equipment that saved energy. The participants asked more often about efficiency for cooking, refrigeration, and ventilation equipment. The significance was seen both during the t-test and regression analysis. The detailed results, including estimated coefficients and regression diagnostics, are presented in Appendix H.

Standard Test Methods – Slightly more than 32% of the participants report that they ask dealers, manufacturers and their reps about how equipment performs on tests using the ASTM testing methods, compared to 44% of the nonparticipants. This difference was not statistically significant (chi square=0.96, p=0.33). Practically speaking, this is a large difference. The lack of statistical significance is probably due to the small number of cases.

Because there was a statistically significant difference between the number of times participants and nonparticipants requested information on energy savings for the cooking, refrigeration, and ventilation equipment, this was felt to be a moderate market effect.

5.3.1.6 Hypothesis #5: Purchase Behavior

Both participants and nonparticipant end users were asked about the efficiency of equipment they would buy today if they were in the market to purchase. Again, three questions addressed each of the three end uses. The analysis used chi square to determine significance.

The chi square analysis for the cooking, refrigeration, and ventilation equipment indicated that a statistically significant greater proportion of program participants would buy higher efficient equipment. The strength of these relationships is judged to be moderate.

Again, it should be noted that this type of question should have been somewhat more difficult to answer than in some other studies since, of the three end uses, only refrigerators have an efficiency rating. As a result, customers may know relatively little about the price and performance of cooking and ventilation equipment. For example, one might have expected a large number of "don't know" responses. One might also have expected some differences between refrigeration and the other two end uses. It is possible that the respondents are better informed, since there appears to be active communication between manufacturers and end users regarding the energy use of equipment. Of course, in general, respondents are not always able to accurately predict their future purchase behavior. Therefore, how much credence should one put in these responses? While this is impossible to determine accurately, it was concluded that there is some measurement error in the responses, though how much is impossible to determine. However, assuming the same level *and* direction of measurement error for the participant group and nonparticipant end user group, the cross-sectional comparisons should still be reasonably valid.

5.3.2 Nonparticipant End User

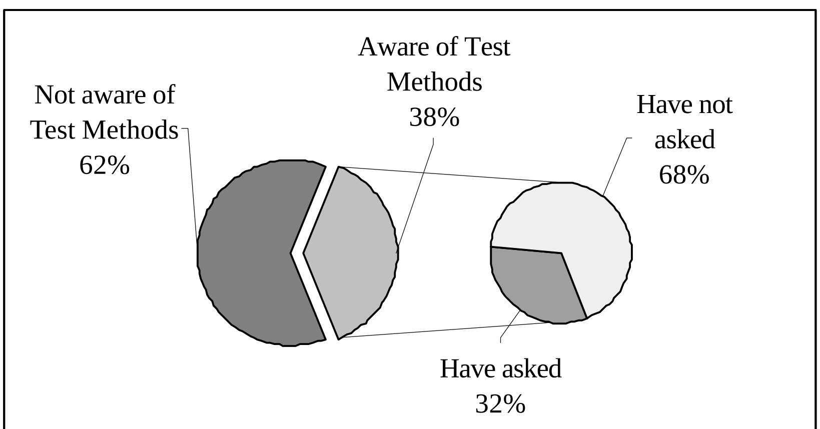
5.3.2.1 Hypothesis #6: Require Performance Data

Exhibit 5.76 presents the extent to which nonparticipant end users request from manufacturers information about equipment which save energy and information about the performance of equipment using the ASTM standard testing methods.

Exhibit 5.76
Information Requested by End Users from Manufacturers and Designers

	Mean	95% CL (+/-)
Within the past few years, how many times have you asked your dealer, manufacturer, their sales representative, or designer about cooking equipment which saves energy?	1.5	0.53
Within the past few years, how many times have you asked your dealer, manufacturer, their sales representative, or designer about refrigeration equipment which saves energy?	2.2	0.98
Within the past few years, how many times have you asked your dealer, manufacturer, their sales representative, or designer about ventilation equipment which saves energy?	1.0	0.37

Exhibit 5.77
Ever Ask Dealers or Manufacturers about the Performance of Specific Equipment Using ASTM Testing Methods

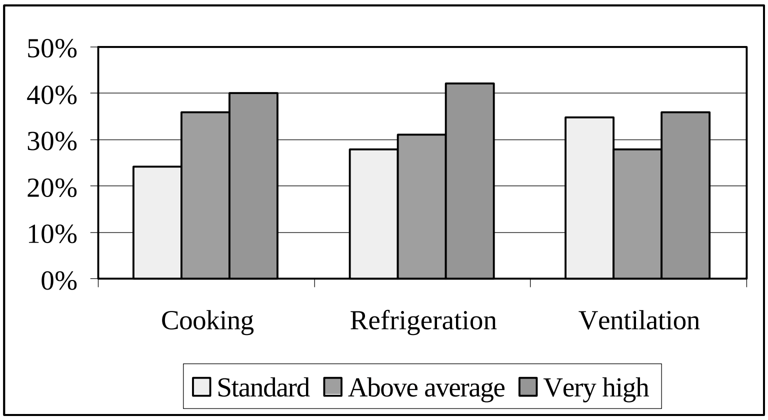


The information in these two exhibits is difficult to interpret in terms of market effects caused by the FSTC owing to the lack of a comparison group and data over time. The conclusion is that one must wait until data over time can be collected so that comparisons can be made.

5.3.2.2 Hypothesis #7: Purchase Behavior

Nonparticipant end users were asked to describe, if they had to replace cooking, refrigeration, or ventilation equipment today, the efficiency level of the equipment they would buy. Would it be standard efficiency, above average efficiency, or very high efficiency? Exhibit 5.25 is repeated below for convenience.

Exhibit 5.78
Efficiency of Equipment if Purchasing



The information in this exhibit is difficult to interpret in terms of market effects caused by the FSTC owing to the lack of a comparison group and data over time. The conclusion is that one must wait until data over time can be collected so that comparisons can be made.

5.3.3 Manufacturer

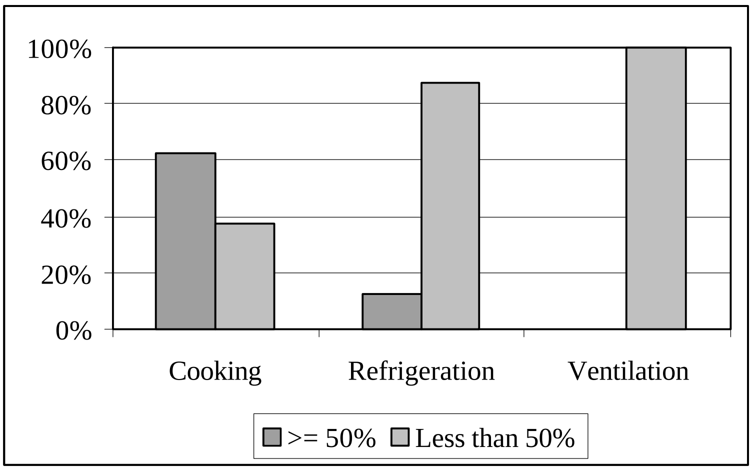
Since only cooking equipment manufacturers were asked questions about the ASTM test methods, any potential market effects results are directed to this group only. Both of the hypotheses for the manufacturer deal with the use of standardized test methods, either in general use (such as advertising) or in the development process. As such, the fact that there are any test methods present at all has been influenced heavily by the FSTC. However, since there were no data collected during the early years of the existence of the FSTC, there can be no comparison of use of energy efficient test methods then versus now. This section presents hypothesis-specific information already mentioned in the baseline section.

5.3.3.1 Hypothesis #8: Use FSTC Test Data

Each manufacturer states they have about the same percentage of energy efficient options available for their customers (around 80%). However, cooking equipment manufacturers state they recommend energy efficient equipment to their customer more often than the other two manufacturers. Exhibit 5.35 has been slightly modified to remove the "don't know" responses and break down the information into those recommending energy efficient information 50% of the time or more and less than 50%

of the time. The results, in Exhibit 5.79, indicate that cooking equipment manufacturers discuss energy efficient equipment with their customers at a much higher rate than either refrigeration or ventilation manufacturers. The evaluation cannot make a causal linkage between the FSTC test methods and cooking equipment manufacturers to this result. However, the conclusion is that there is circumstantial evidence of a possibility that the FSTC may have affected the behavior of cooking equipment manufacturers through the introduction of the test methods. Since most of the early efforts by the FSTC focused on cooking equipment manufacturers, with little or no attention to refrigeration or ventilation manufacturers, the results shown in Exhibit 5.79 could also be seen as a market effect of the FSTC. Since the FSTC is now also focussing on refrigeration and ventilation, future evaluations may find that the refrigeration and ventilation manufacturers recommend energy efficient equipment more often.

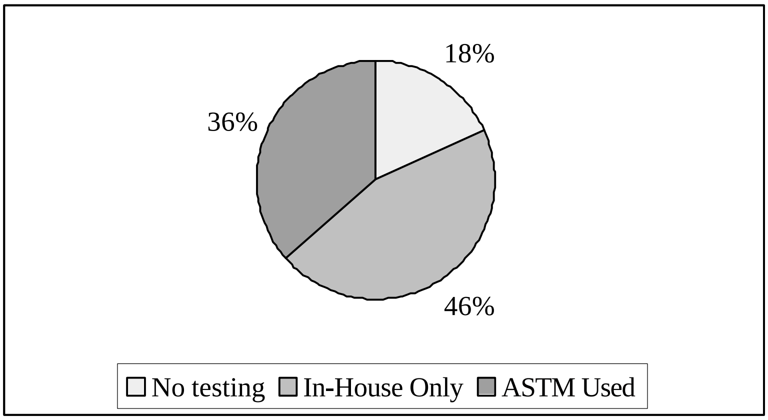
Exhibit 5.79
Recommendation of Energy Efficient Equipment by Manufacturer



5.3.3.2 Hypothesis #9: ATSM Test Methods in Development

The cooking equipment manufacturers must first be aware of the ASTM test methods prior to using them in their manufacturing processes or development. Since 73% of the cooking equipment manufacturers are at least somewhat aware of the methods, there is a high potential for inclusion of these testing methods in the manufacturing process. Exhibit 5.80 shows that most of the cooking equipment manufacturers perform some type of efficiency testing in their manufacturing processes and that 36% are including the ASTM test method in that type of testing. It is possible that this percentage is higher, however, since the respondents knew about the ASTM test methods and knew their company incorporated some sort of in-house efficiency testing in the process, but did not know how actively the company incorporated the ASTM test methods in the manufacturing process (if at all). The converse could also be true since 75% of those using ASTM test methods also indicated they used in-house testing. It was unclear if the respondents differentiated between the ASTM test method and their in-house testing methods. However, 9% of the cooking equipment manufacturers use the ASTM test methods and do not use any other in-house efficiency testing. Since the ASTM test methods have been put in place primarily due to the actions of the FSTC, the conclusion is that there has been some market effect on this hypothesis.

Exhibit 5.80
Efficiency Testing Used

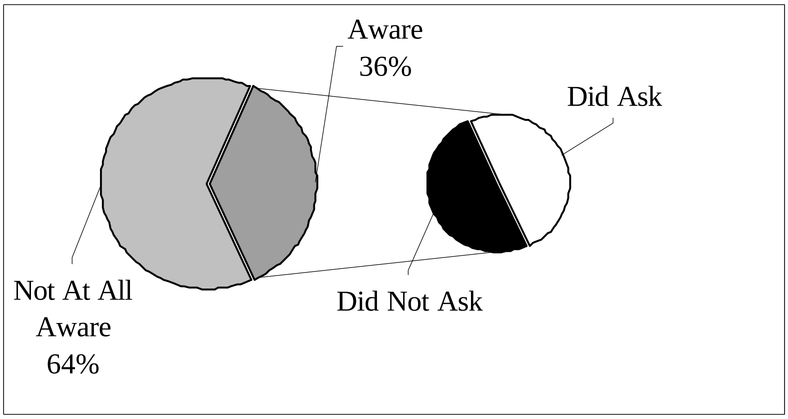


5.3.4 Designer

5.3.4.1 Hypothesis #10: Request ASTM Performance Data

As discussed in the baseline section (5.2.4), only 36% of the designers are aware of the ASTM test methods for cooking efficiency testing. However, of that 36%, half have stated they have asked dealers or manufacturers about how specific pieces of equipment scored on the tests before considering those pieces of equipment (shown in Exhibit 5.81). Because the FSTC has been directly responsible for the existence of the ASTM tests, this is considered to be a market effect attributable to the FSTC.

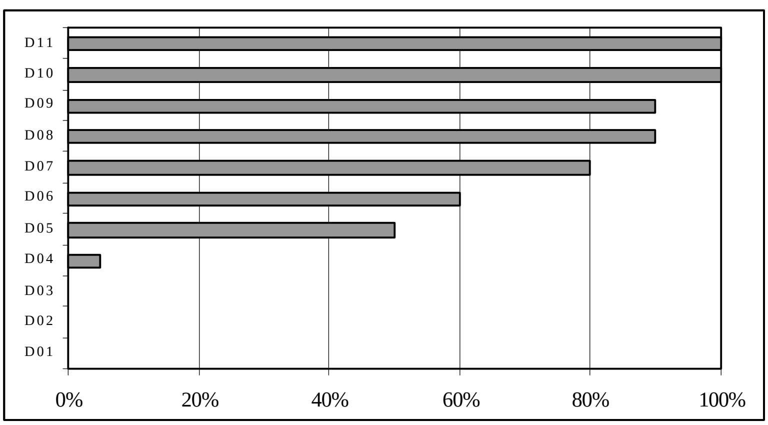
Exhibit 5.81
Requesting of Performance Data



5.3.4.2 Hypothesis #11: Recommend Energy Efficient Equipment

Similar to the manufacturers, there was no information available which indicated the extent to which designers recommended energy efficient equipment prior to this survey and prior to any interaction with the FSTC. Therefore, no specific market effects can be said to be directly attributable to the FSTC. Exhibit 5.82 indicates the variety within the designer group as far as how often they recommend energy efficient equipment (of any type, not just cooking equipment). Three of the designers stated they never recommend energy efficient equipment, while two present such information to their clients every day. The average percentage of time designers recommend energy efficient equipment is 52% ± 25%.

Exhibit 5.82
Percentage of Time Recommend Energy Efficient Equipment



The data showed no difference between the number of times a designer discussed cooking efficiency with their client or the designer's awareness of the ASTM test methods or the FSTC.

5.3.5 ASTM

The FSTC has had a major impact on the development of standardized test methods and championed their eventual adoption by the ASTM. The activity is represented by Linkage #5 in Exhibit 3.1. There was no hypothesis developed regarding this linkage since the FSTC's success in this area was known since the beginning of this study. However, reporting these accomplishments cannot be ignored as a significant market effect. Exhibit 5.83 lists the seventeen testing methods that have, to date, been adopted by the ASTM.

Exhibit 5.83
ASTM Test Methods Adopted to Date

Test Method Name	Test Method Number
Standard Test Method for Performance of Braising Pans	F 1786-97
Standard Test Method for Performance of Combination Ovens	F 1639-95
Standard Test Method for Performance of Commercial Kitchen Ventilation Systems	F 1704-96
Standard Test Method for Performance of Convection Ovens	F 1496-93
Standard Test Method for Performance of Conveyor Ovens	F 1817-97
Standard Test Method for Performance of Deck Ovens	F 1965-98
Standard Test Method for Performance of Double-Sided Griddles	F 1605-95
Standard Test Method for Performance of Griddles	F 1275-95
Standard Test Method for Performance of Open Deep Fat Fryers	F 1361-95
Standard Test Method for Performance of Pasta Cooker	F 1784-97
Standard Test Method for Performance of Pressure and Kettle Fryers	F 1521-96
Standard Test Method for Performance of Range Tops	F 1521-96
Standard Test Method for Performance of Rotisserie Ovens	F 1787-97
Standard Test Method for Performance of Steam Cookers	F 1484-93
Standard Test Method for Performance of Steam Kettles	F 1785-97
Standard Test Method for Performance of Underfired Broilers	F 1695-96
Standard Test Method for Energy Performance of Single Rack, Hot Water Sanitizing, Door Type Commercial Dishwashing Machines	F 1696-96

5.3.6 Assessing the Longevity of Market Effects

As noted in 4.3.4, Prahl (1998) has provided three examples of evidence that could help to support a claim that any observed market effects are sustainable.

1. whether the observed market effects are inherently difficult to reverse, such as the retooling of manufacturing production lines,
2. the successful prediction of near-term market effects that are expected to lead to long-term market effects, and
3. whether the sequence of observed market effects to date is as predicted by the initial justification of the program.

Of the three examples of evidence by Prahl (1998), the results of the evaluation showed many successful predictions of near-term market effects that are expected to lead to long-term market effects. These were:

- As predicted, the FSTC appears to have achieved some success in affecting near-term market effects, i.e., increasing the attitudes, knowledge, and awareness of FSTC participants.
- As predicted, the FSTC appears to have achieved some success in affecting near-term/intermediate-term market effects, i.e., reducing the participants' perceptions of market barriers.
- As predicted, the FSTC appears to have achieved some success in affecting the intermediate market effects, i.e., participants' stated intentions to purchase efficient equipment.

A longer-term effect is the development of standard testing methods and the adoption of the testing methods by the ASTM. For manufacturers, an indication could be their decision to test their own equipment using standard testing methods and to provide the results of these tests to designers and end users.

- As predicted, the FSTC appears to have achieved some success in affecting the intermediate/long-term market effects, i.e., ASTM adoption of standard testing methods developed by the FSTC. This appears difficult to reverse.

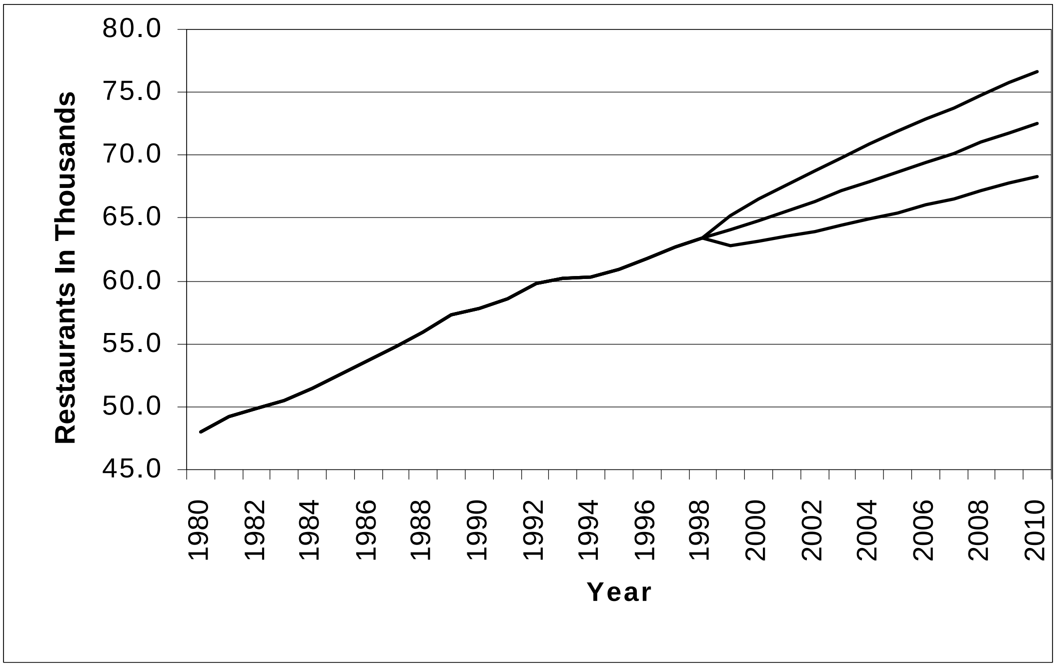
5.4 Forecasting Future Effects

The requirement to forecast future market effects was originally stated under Research Objectives 9 and 12. This involved estimating the technical, economic, and market potential of refrigeration, cooking, and ventilation equipment. Also involved was an estimate of the future market effects. The results of these efforts are presented below.

5.4.1 Forward-Looking Assessment of Market Potential

The first element of this estimate of technical, economic and market potential is a forecast of the number of restaurants through the year 2010. In 2010, it is expected that there will be approximately 72,500 restaurants in California. Exhibit 5.84 presents this forecast along with the 95% confidence intervals around the forecast.

Exhibit 5.84
Restaurant Forecast Through 2010



Estimates of the current level of saturation or penetration of cooking, refrigeration, and ventilation equipment are presented in Exhibit 5.85.

Exhibit 5.85
Estimates of Units of Equipment in 1999

Equipment Type	Estimates of Units in 1999 (000)
Cooking Equipment	394.1
Refrigeration Equipment	256.2
Ventilation Equipment	64.1

The estimates of technical, economic, and market potential are presented in Exhibit 5.86.

Exhibit 5.86
Technical, Economic, and Market Potential in 2010

Equipment Type	Technical (000)	Economic (000)	Market (000)
Cooking Equipment	446.2	232.5	197.6
Refrigeration Equipment	290.1	151.1	128.5
Ventilation Equipment	72.5	37.8	32.1

5.4.2 Hypothesized Future Market Effects

The diffusion curves that are presented below in Exhibit 5.87 through Exhibit 5.92 are estimates of the path toward market potential over time for cooking, refrigeration, and ventilation equipment under the no-label and label scenarios. Note that each diffusion curve starts at a level representing the currently estimated saturation. Again, these diffusion curves are presented as heuristic devices for understanding the complex web of assumptions that drive any analogical diffusion curve. Such heuristic devices can be very useful for strategic program planning.

Exhibit 5.87
Diffusion Curve for Cooking Equipment: No Labeling System

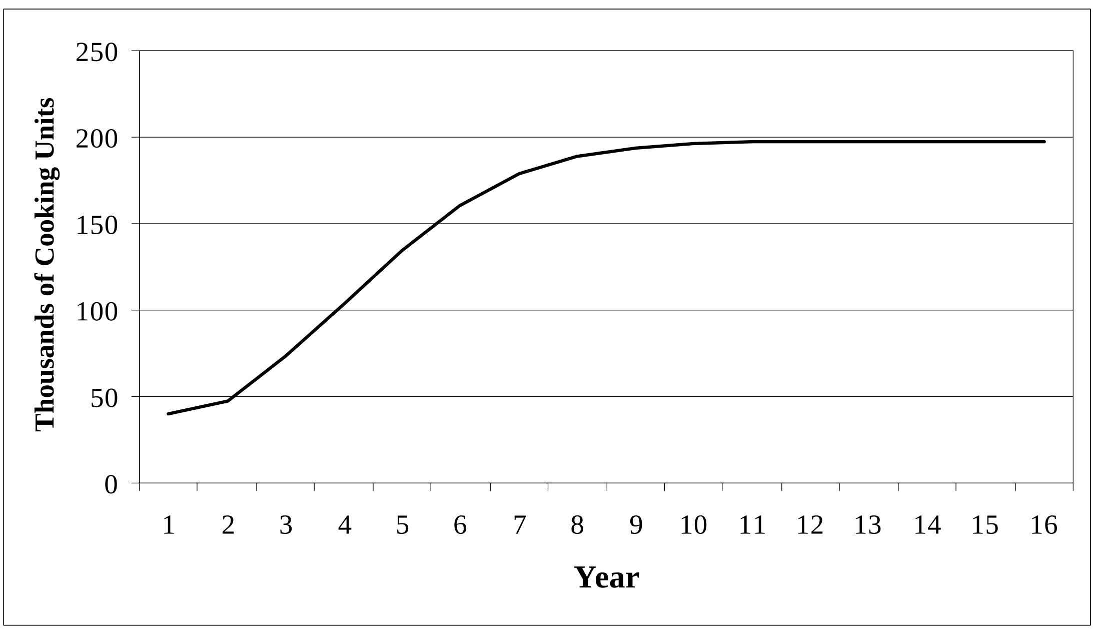


Exhibit 5.88
Diffusion Curve for Cooking Equipment: Labeling System

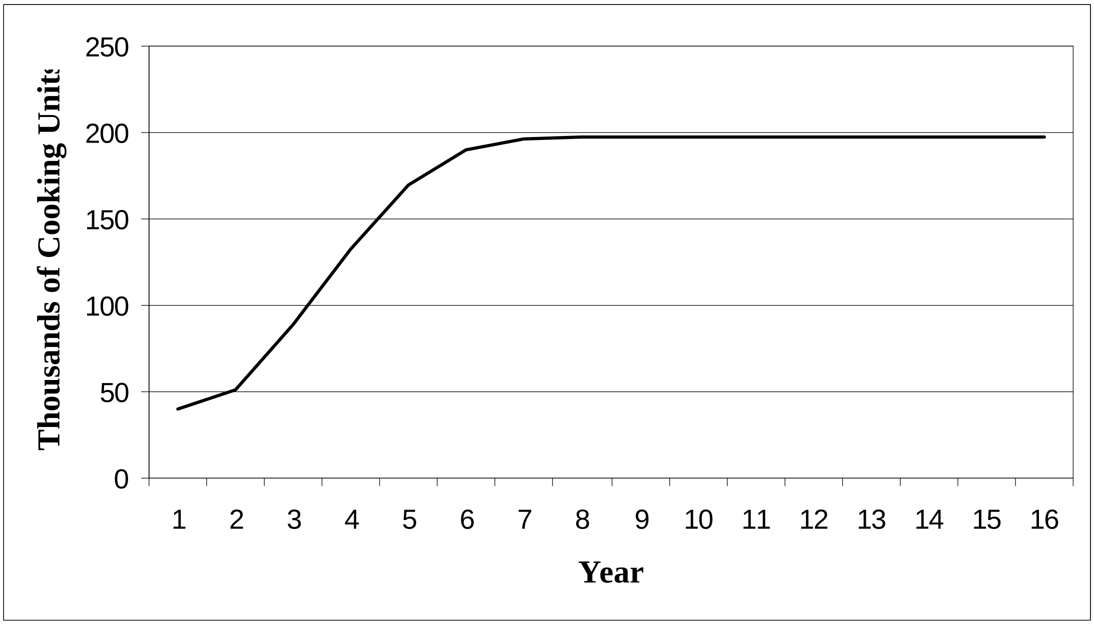


Exhibit 5.89
Diffusion Curve for Refrigeration Equipment: No Labeling System

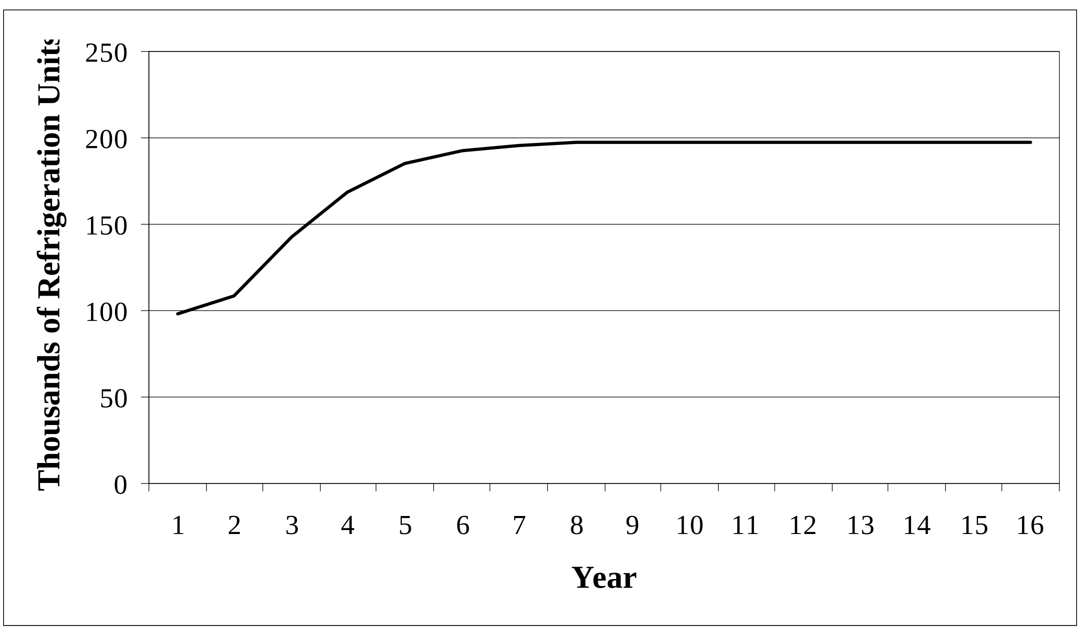


Exhibit 5.90
Diffusion Curve for Refrigeration Equipment: Labeling System

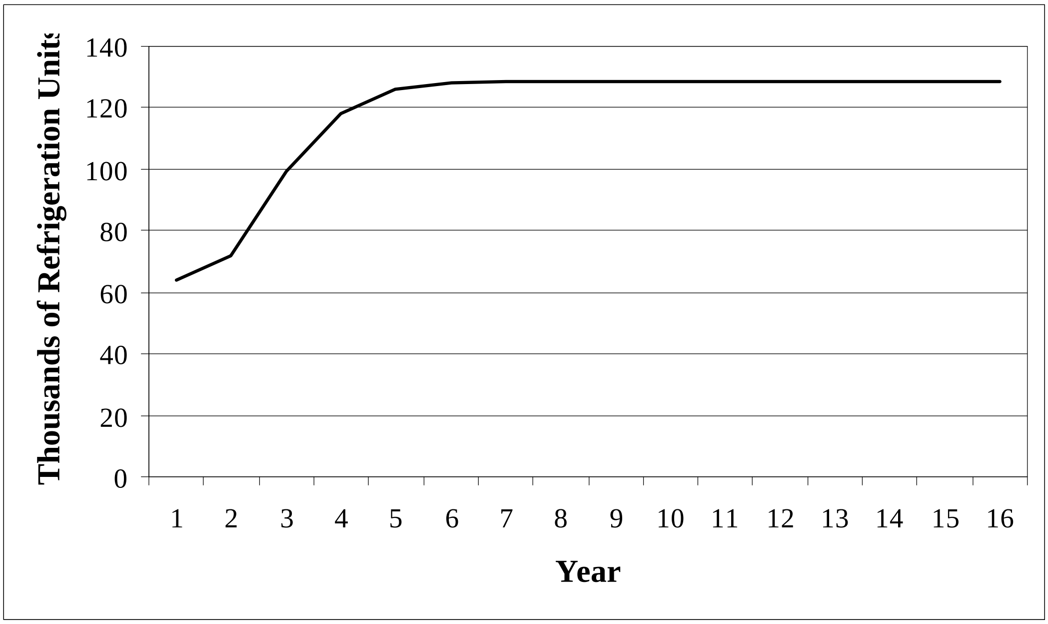


Exhibit 5.91
Diffusion Curve for Ventilation Equipment: No Labeling System

Exhibit 5.92
Diffusion Curve for Ventilation Equipment: Labeling System

The key results of these six scenarios are summarized in Exhibit 5.93. For each scenario, this exhibit shows the numbers of years required to reach 100% saturation.

Exhibit 5.93
Years to 100% Saturation by End Use and Scenario

Equipment Type	Years to 100% Penetration
Cooking Equipment: No Labels	10
Cooking Equipment: Labels	7
Refrigeration Equipment: No Labels	7
Refrigeration Equipment: Labels	5
Ventilation Equipment: No Labels	15
Ventilation Equipment: Labels	8

From Exhibit 5.93, one can draw the obvious conclusion that, in our judgement, establishing a labeling program can have a significant impact on penetration. However, one can imagine numerous scenarios with Ino and Imi parameters that are equally defensible. To repeat, the primary value of such diffusion scenarios is for their strategic planning value.

Section 6
Conclusions and Recommendations

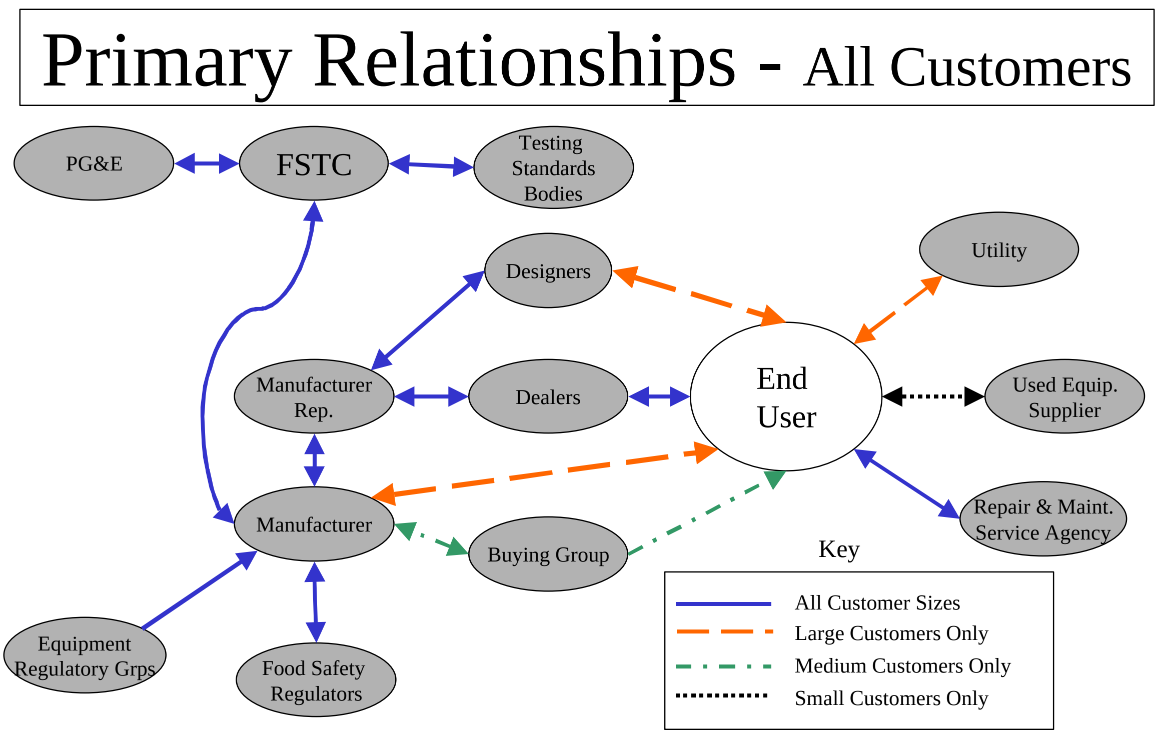
6.1 Conclusions

This section summarizes the findings and conclusions of the evaluation. It sequentially addresses the three overarching research objectives: (1) characterize the market addressed by the FSTC (including baseline market condition), (2) assess the market transformation effects attributable to the FSTC efforts, and (3) lay the groundwork for future programs and evaluations.

6.1.1 Market Characterization

Exhibit 6.1 illustrates the major market interactions by size of end user affected, who they interact with, and why the interaction occurs. There are many less-frequent interactions between these market actors that are discussed in detail in the body of the report.

Exhibit 6.1
Primary Foodservice Market Interactions



- One of the most important facts that emerged from the market characterization is that energy efficiency appears to be a very low priority for foodservice providers.

Market forces seem to dictate a low priority for energy efficiency due to the following:

- Energy costs represent 3% to 5% of operating costs, while labor and material costs are on the order of 30% each.
- Growth is the primary objective for most foodservice entrepreneurs. Kitchen equipment costs are kept low as part of capital spending minimization.
- Performance, reliability, durability, and cost almost always come before energy efficiency in end users' selection criteria. As the size of the end user decreases, price rapidly becomes the most important purchase criterion.

6.1.2 Baseline

While the overall results include many other aspects, this baseline summary presents only the market barrier information. Market barriers are reviewed first by market actor, then are discussed across market actors, by barrier.

6.1.2.1 Barriers by Market Actor

A review of the market barrier data illustrates the following:

- **End Users**. The largest barrier for end users is performance uncertainty. That asymmetric information is the next highest barrier seems logical, since sales staff may exaggerate the performance claims of the equipment. It is a little surprising that the information-search costs barrier is so much lower than performance uncertainty, since information should reduce performance uncertainty. One explanation is that, while information may be readily available, performance information is not often provided or, when it is provided, the customer does not find it credible.
- **Manufacturers**. The largest barrier, as seen by the manufacturers, is that of split incentives. The customer who makes the decision on a piece of equipment is not the person who would see any benefits in operating or maintenance costs.
- **Designers**. Designers do not seem to feel that there are barriers to energy efficiency. Designers were not asked questions on split incentives or performance uncertainty because the initial market characterization indicated that these were not barriers for them.

6.1.2.2 Barriers Across Market Actors

A review of the market barrier data illustrates the following:

- End users perceive organizational practices as more of a barrier than either designers or manufacturers. This indicates that end users see more organizational obstacles to implementing energy efficiency within <u>their</u> organizations than manufacturers see in the development of efficient equipment or designers see in developing efficiency recommendations.

- There is a big difference in how the manufacturer and end user perceive the performance uncertainty of energy efficient equipment, with end users considering it much more of a barrier. This is logical because the manufacturers are the creators of the information and are more likely to be motivated to make certain that it is correct. Also manufacturers are less likely to admit they are uncertain of energy efficiency performance. On the contrary, the end users currently rely on manufacturers for performance information, since standardized information is not widely available.
- Split or misplaced incentives is perceived to be more of a barrier by the manufacturers than the end users. This may be a result of the samples for each group. End users represented a wide range of company size. The manufacturers, however, tend to have direct interactions with large chains, where split incentives are more likely to be present. They most likely based their responses on those direct interactions.

6.1.3 FSTC Market Effects

In general, the market effects identified as attributable to the FSTC are:

- FSTC has produced some near-term quantifiable effects for participants (i.e. awareness, knowledge, participant perceptions of market barriers, projected purchase decisions, etc.).
- It was not possible to assess market effects for nonparticipants because no prior benchmarks exist.
- FSTC has had weak manufacturer and designer market effects. It should be noted, however, that while not a specific hypothesis, the FSTC has very high market recognition in the manufacturer/designer community. This is an important market effect in itself.
- FSTC is having a major effect on ASTM test procedure development, which is not likely to be reversed.
- Overall, the FSTC program is addressing virtually all of the crucial communication links and market barriers.

It is important to recognize that the FSTC was almost prophetic in that from its inception in 1986, it has been structured as a market transformation program. From the first Advisory Board meeting in August 1986, the Advisory Board recommended, and the FSTC implemented, a nationally orchestrated approach to develop test procedures, supply information, influence market actors, and, generally, to change the structure of the market to favor energy efficiency.

Clearly, the foodservice industry is one of the more complex markets to try to change, because of the number and diversity of the market actors. The FSTC program is a good example of how market transformation programs should work, and how long it actually takes to change a very diverse market with no initial energy efficiency infrastructure in place.

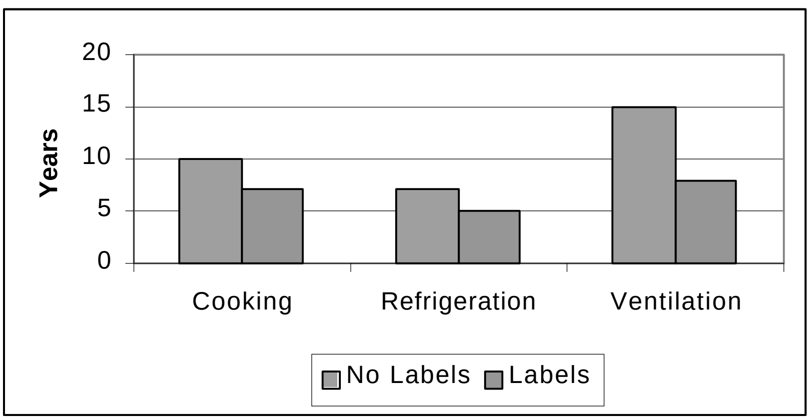
6.1.4 Forecasting Market Effects

The diffusion analysis was use to project the path towards market potential over time for cooking, refrigeration, and ventilation equipment under two scenarios, one with no-labeling system present and one with a labeling system present. The results, as illustrated in Exhibit 6.2, suggest:

- Establishing a labeling program can have a significant impact on market penetration for all three technologies.
- The labeling system shows the largest effect on ventilation because it starts at the lowest assumed penetration and because lack of previous marketing of energy efficient systems is assumed to have the highest impact on both imitators and innovators.

It is crucial for readers to realize that the primary value of diffusion analysis forms a framework for thinking about and understanding the complex web of assumptions that underlie market forecasts. Such heuristic devices can be very useful for strategic program planning, *but are highly dependent upon the input assumptions*. They can be particularly useful in identifying information and data needed to better understand the market.

Exhibit 6.2
Years to 100% Saturation by End Use and Scenario



6.2 Recommendations

The recommendations section is divided into recommendations on Study Methods, Program Design, Future Studies, and Data Collection Opportunities.

6.2.1 Study Methods

Since this study is the baseline for future market effects studies, there are two measurement issues that require discussion.

1. **Customer Self-Projection of Future Purchase of High Efficiency Equipment.** During the end user surveys, the majority of customers stated they would buy above average efficiency equipment in the future. This finding did not agree with most other indicators of the priority of energy efficiency for the end users. The evaluation team and the FSTC Advisory Board focus groups both feel that the question failed to measure the parameter as well as desired (i.e., the validity of these questions was somewhat less than desired). This is probably because the generally low level of information on the efficiency/performance of equipment does not allow the end user to judge energy use, equipment performance, or extra costs tied to the higher efficiency purchase. Those end users that lacked basic experience may have given the socially acceptable answer. In the future, attempts should be made to collect information not only on stated preferences but also on revealed preferences.
2. **Reported Levels of Manufacturer Use of ASTM Test Procedures.** About 50% of the cooking equipment manufacturers reported frequent use of ASTM test procedures. This finding was questionable enough that the evaluation team asked the focus groups to explain the findings. The Advisory Board members did not find the claims credible. Future evaluation efforts should ask more detailed questions in this area to establish actual use patterns.

6.2.2 Program Design

1. **Develop Methods of Increasing Recognition and Use of ASTM Test Results.** One of the findings of the market characterization and the market effects study is that while the FSTC has relatively high name recognition in the industry, the recognition of the ASTM standardized test procedures was low among designers and end users. This is combined with the fact that the market characterization identified weak and moderate communication avenues between the ASTM and the designer/end user communities, but could not identify a major communication channel.

   The evaluation team recommends that the FSTC consider one or both of the following means of promoting recognition/use/acceptance of the ASTM standardized test procedures.

   - Encourage/support a voluntary labeling or standards system in the cooking appliance arena. This relatively direct approach would create a major channel for recognition and use of standardized test procedures. However, such a step should be taken with forethought and care. During the FSTC Advisory Board focus groups, the evaluation team raised the subject of labeling and standards. While the focus groups were split on the viability of introducing labeling, they virtually unanimously felt that an industry consensus standards system would not be acceptable to the industry at large. Further, they pointed out, both during the focus groups and afterwards, that there was potentially serious risk (with some historic precedence) to the support and goodwill that the FSTC currently has in the industry if it promotes these approaches. The largest concern was about loss of manufacturer and chain end user support. Thus, any such strategy should be well thought out and carefully implemented. All potential ramifications should be explored.

- Expand, accentuate, and bolster the outreach efforts, emphasizing the use of the standardized test methods by chains in specifications and by the manufacturers in sales. The FSTC staff is currently doing outreach. This recommendation suggests a different order of magnitude of outreach. Essentially, this would require a redirection of current program funding or an augmentation to fund the effort. The effort required to change recognition of the testing methods in the cooking equipment industry would have to be as focused, visionary, and sustained as the original effort to develop the test methods. This is a long-term approach and may prove to be both more costly and more difficult to sustain. However, it may also prove to be less politically sensitive resulting in better chances of success.

2. **Consider Targeting Small Customers.** The small customers, who represent approximately 47% of the market, appear to be under-served. This conclusion is based several observations. First, smaller customers perceive the information and search cost barrier to be higher than do larger customers. This may, in part, be due to the fact that the *Foodservice Equipment reports* is targeted to those companies that annually invest more than $100,000 in equipment. In addition, small companies often invest in used equipment because they may have chronic cash flow problems, inherently larger discount rates, or, possibly, aren't certain their restaurant will survive for longer than two to three years.

   Recently, the Nonresidential Standard Performance Contracting Program was re-designed to address not only the large non-residential customers but also the small non-residential customers. We recommend a similar attempt to address the needs of the small customer. This could begin with a series of meetings to discuss the benefits and costs of such an effort.

3. **Develop Methods to Educate Designers on ASTM Test Methods.** Designers would be expected to be the some of the most sophisticated market actors, requiring detailed information and specific answers to service their clients. However, the designer interviews reveal that, even though 82% received *Foodservice Equipment reports*, only 36% of the designers were aware of ASTM test methods. While the majority of the designers interviewed serviced the institutional market, the designer community appears to be an underused resource or channel for communicating the value of ASTM test methods, results, and other energy efficient information. These market actors seem to have the ability to influence a wide range of clients if they had such information. Thus, the FSTC should develop methods to increase designer awareness of ASTM cooking equipment test methods, test results, and the plethora of information available from the FSTC.

Program Tracking Database

The FSTC should invest in the development of a more comprehensive tracking system for all customers, designers, and manufacturers who visit the FSTC, call the FSTC, or visit its Web site. This would allow for better targeted and more effective client communications and program evaluations.

6.2.3 Future Studies

Using saturation data over time as a way of measuring the success of market transformation programs requires far too much time if the goal is to provide program designers timely information for modifying their programs to maximize market effects. Given this problem, the measurement of proximate or intermediate indicators, such as customer attitudes and perceptions of market barriers, holds the most promise for informing program designs and measuring program success. It is strongly recommended that much more work be done in the development of scales designed to measure all relevant proximate or intermediate market effects. If valid and reliable scales could be developed for each sector, end use, and market actor, they could be used for the evaluation of all market transformation programs in California, thus allowing more rigorous comparisons across time and programs.

6.2.4 Data Collection Opportunities

PG&E/FSTC should consider participation in the commercial market share tracking system and the commercial saturation survey that are being managed by the California Energy Commission (CEC). Consideration should be given to requesting that CEC include key foodservice technologies.

Tracking the absolute and marginal saturation of cooking, refrigeration, and ventilation equipment in the commercial foodservice industry is an essential task if one is interested in monitoring the penetration of energy efficient equipment. However, such a task poses unique problems since there is relatively little performance data available for many of these technologies. For example, even if one obtained, through on-site visits, the manufacturer and model number for griddles, one would still have to conduct performance tests so that the griddles could be ranked in terms of energy efficiency. Owing to the high cost of performing a saturation survey followed by performance testing, we recommend that only key technologies be included in the list of equipment targeted by the CEC for the market share tracking system and its saturation survey.

Customer Energy Efficiency Program
Measurement and Evaluation Program

PACIFIC GAS & ELECTRIC COMPANY'S 1998 Food Service Technology Center Market Effects Study

- Appendices -

STUDY ID: 420MS-D

June 30, 1999

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

All inquiries should be directed to:

Lisa K. Lieu
Revenue Requirements
Pacific Gas and Electric Company
P. O. Box 770000, Mail Code B9A
San Francisco, CA 94177

Equipoise Consulting, Inc.

Energy Analysis

Project Management

Training

Appendices for

Pacific Gas & Electric's
1998 Food Service Technology Center
Market Effects Study
Final Report

Submitted by:

Equipoise Consulting Incorporated

in association with
Ridge & Associates,
Energy Solutions, and
RJ Research

June 30, 1999

Equipoise Consulting Incorporated is committed to environmentally friendly practices in the workplace. We use recycled paper in all our proposals and reports. We print double sided and use electronic faxes when possible to decrease paper use. All our office paper is recycled. Our 'virtual' office arrangement means that work between colleagues is performed by telecommuting, thereby minimizing transportation requirements.

Table of Contents

Appendix A
Literature Review

December 31, 1998

To: Amalia Klinger, Pacific Gas & Electric Company

From: Tim Caulfield, Equipoise Consulting Incorporated

Re: Literature Search Summary Memorandum
Foodservice Technology Center Market Effects Study

The second task in the Foodservice Technology Center Market Effects Study (Study) is titled “Identify and Review Relevant Literature and Other Data”. The Task 2 deliverable is specified as “Memorandum identifying and reviewing existing relevant literature, research, and other data and information to the PG&E Project Manager.”

This memorandum lists the documents reviewed, or groups of documents where appropriate, then presents a summary of key element or elements that are to be found in the document(s). The purpose of these summaries is to allow quick access to information during future project tasks.

A comprehensive bibliography of the reports reviewed is provided in Attachment A.

The literature search focused on literature and research in the areas related to the Study objectives. Of specific interest were documents on evaluation techniques used in similar programs, industry size and structure, and the industry testing process. It is well established that the breadth of sources is limited simply because there are a limited number of organizations conducting energy efficiency testing for foodservice equipment. Most of the literature on actual efficiency testing is from the FSTC. Other industry information is available from other foodservice players such as foodservice consultants and the various trade and industry associations. In addition we searched the University of California library system through their on-line Melvyl® search system.

While this completes the formal literature search, the Team fully anticipates that additional literature will be unearthed and reviewed as the project progresses. Any additional sources will be documented in the final project report

Document Summaries

Arthur D. Little. *Opportunities and Competition in the Foodservice Industry.* 1995 Sales and Marketing School, The New England Gas Association. February 10, 1995.

This presentation provides a sweeping overview of the foodservice industry nationwide. The following are some of the points relevant to the market characterization.

- US 1994 foodservice industry was $280 Billion in operator sales (revenue not equipment sales), 660,000 "units" (don't know whether this is units sold or stores) and shows about a 2.0% annual sales growth.
- Industry growth and replacement represents about 30,000 opportunities per year to convert operators to natural gas…

  - Increase in foodservice establishments = ~10,000 units/yr.
  - Replacement of closed restaurants = ~20,000 units/yr.
- As of 1990 natural gas accounted for ~80% of the US foodservice on-site energy consumption:
  - Total consumption ~345 Bcf
  - 8 categories of equipment represented ~80% of the 345 Bcf
    - Heavy Duty Range ~23%
    - Convection oven ~21%
    - Deck Oven ~16%
    - Floor Mounted Fryers ~8%
    - Atmospheric Griddles ~7%
    - Underfired Broilers ~5%
    - Other ~20%
- 1995 total market for commercial appliance hardware is about $4 Billion.
  - Cooking and warming 24%
  - Storage and handling 20%
  - Washing/sanitation 19%
  - Serving equipment 14%
  - Food preparation 11%
  - Custom fabrication 12%

- From 1990-1993 the equipment unit shipments were approximately

-	Floor Fryers	60,000
-	Convection Ovens	41,000
-	Griddles & Grills	31,000
-	Broilers	14,000
-	Combi ovens/steamers	5,000

- Good list of industry information sources on page 30.
- Equipment type breakdown (ovens, fryers, …) of typical capacities, installed units, typical uses, etc.

PG&E FSTC. *PG&E Foodservice Technology Center Training Seminar: Foodservice Energy Primer.*

- Where does Foodservice energy go?

-	Food Preparation	35%
-	HVAC	28%
-	Sanitation	18%
-	Lighting	13%
-	Refrigeration	18%

- Good comparisons of costs of using comparable equipment for gas and electric.
- "Foodservice industry spends about $10 billion dollars per year on energy". Note: This matches with information from ADL report (maybe not by chance) that says the foodservice industry is $280 billion annually and energy represents about 3% of that amount.
- About 28% of the energy use is HVAC and about half of this is ventilation related: removing grease laden air and conditioning replacement air.

Xenergy Incorporated. *PG&E Market Transformation Planning Study, Volume 2: Foodservice Technology Center Mini-Study.* June 10,1997

This report summarizes the program and relies extensively on interviews of the FSTC staff and Advisory Group. It proposes a more complete assessment of the market effects of the FSTC. The appendices list:

- all of the reports and proposed standard test procedures that have been issued by the FSTC,
- the attendees at the May 23, 1997 FSTC Symposium,
- a copy of the report titled "Development and Application of a Uniform Testing Procedure for Griddles", dated March 1989.

American Society for Testing and Materials, *What is the ASTM?* Revised 1996.

This is a folded brochure that summarizes the role that the ASTM plays in establishing and maintaining industry standards. It supplies short descriptions on the standards that the ASTM attempts to produce, how they produce them, how they are used, and how they apply to the industry.

PG&E Foodservice Technology Center, *PG&E Foodservice Technology Center Training Seminars*, October 1998.

This is a list of all of the seminars scheduled by the FSTC from January 1, 1998 onward. It presents the seminar date, the number of attendees, and the status.

American Society for Testing and Materials, *Committee Membership Roster*, *F26 0600 Productivity and Energy Protocol*, September 25, 1998.

Lists the name, corporate association, address, phone number, email address and status for all members of this committee. The F26 committee is the primary committee that the FSTC interacts with in attempting to get standard procedures endorsed by the ASTM.

American Society for Testing and Materials, *Standard Tracking System*, *Subcommittee: F26 0600 Productivity and Energy Protocol*, September 11, 1998.

Lists the history of all of the standards approved by the F26 0600 Productivity and Energy Protocol Subcommittee since it’s inception. It also summarizes the distribution of member voting rights and votes on recent ballots by the subcommittee.

PG&E Foodservice Technology Center, *STM Development Schedule*, September 1998.

This document is a Microsoft Project printout that presents the timeline for all FSTC Standard Test Method (STM) development from September 1998 through March of 2001. It lists the name of the FSTC staff person responsible for each development, along with the subtasks and the planned timeline for each subtask.

PG&E Foodservice Technology Center, *Final Program – Cashing in on Appliance Performance Testing, a Foodservice Equipment Symposium*, May 27, 1997.

Presents the program agenda, with short description of each event, for this day and a half seminar put on by the FSTC. Also attached is an attendance list with corporate affiliations for the 87 attendees.

Foodservice Equipment Reports Tech Report, *PG&E Lines Up Combies*, May 1998, page 68.

This article presents the finding of the FSTC on comparison tests of three combination ovens. It summarizes the results in a clear four page article, presenting cooking time for standard cooking loads in both convection and combination mode, the cost to operate per standard load, and an annual operating cost under specified conditions. The results are presented for both gas and electric appliances.

Foodservice Equipment Reports Tech Report, *Broiler Comes of Age*, May 1998, page 46.

This four and a half page article documents the development of the test procedure for underfired broilers and the submission to and acceptance of the procedure by the ASTM. It also documents the comparison of two broilers, one gas and one electric, when they are run through the procedure. It presents graphic displays of the temperature distribution across the broiler working surface.

Foodservice Equipment Reports Tech Report, *Lab Time! 3 Steamers Take the Test*, May 1998, page 132.

This article presents the results of tests run under a modified ASTM test procedure for one five pan and two three pan countertop convection steamers. The results for each phase of the test are presented and discussed, along with an overall analysis of the relative productivity and efficiency performance of the three units. All results are presented on an anonymous basis.

PG&E Presentation by Grant Brohard, *Foodservice Industry Information Opportunities*, Undated, believed to be from November 1998.

This presentation provides a good overview of the size of the industry and the FSTC programs and research approach. Its weakness is that only one set of numbers are attributed in the entire presentation.

Electric Power Research Institute Research Report TR-110775. *Electric Utility Marketing Guide to Foodservice.* Prepared by Bevilacqua-Knight, Inc. August 1998.

This report is designed to address key issues facing utility foodservice programs by providing a set of guidelines and advice. It is put together to assist a utility servicing the foodservice industry to become more profitable and to elicit fuel switching to electric from gas. The report has three sections: “Designing and Managing a Foodservice Program”, “Designing and Managing a Foodservice Technology Center”, and Profitability Analysis for Utility Foodservice Groups”. On page 1-3 of the report, it has market segments and the key segment decision makers.

Electric Power Research Institute Technical Assessment Guide. *Volume 2: Electricity End Use Part 2: Commercial Electricity Use.* Prepared by Joseph A. Pietsch. 1992 Edition.

Thirteen percent of all commercial energy use is by restaurants and other foodservice establishments. (Commercial energy use is 6,500 trillion Btu). Foodservice industry spent $9 billion on energy in 1990. Of that total, $6.5 billion was spend on approximately 90 billion kWh of electricity. On average, the kitchen accounts for 75% of the energy use while the dining is the other 25%. This document also uses the 1989 Equipment and Supply Study performed by the National Association of Food Equipment Manufacturers (used in the Foodservice Equipment Application Report) and has tabular information gathered on market share by equipment type. That survey was from a sample of 1,503 mailed questionnaires completed by owners or managers of eating and drinking establishments. The data are extrapolated to cover a national universe of 375,000 establishments. “Equipment Monitor”, published by Restaurant Business Magazine asked an unknown number of food service providers why they purchased equipment – energy efficiency was no where on that list. The report mentioned that only chains and sophisticated buyers used operating costs and payback to determine purchases. The report also mentioned the ASTM rating procedure (p7-33), but stated that the procedure was not being used by any independent testing organization. The majority of the document states ways in which specific pieces of equipment can potentially save energy.

Electric Power Research Institute Appliance Performance Foodservice Update. *Electric and Gas Fryers.* Issue 1, August 1996.

This document pulls from testing done at the FSTC to show that electric is superior to gas.

Electric Power Research Institute Appliance Performance Foodservice Update. *Electric and Gas Range Tops.* Issue 2, August 1996.

This document pulls from testing done at the FSTC to show that electric is superior to gas.

Electric Power Research Institute Appliance Performance Foodservice Update. *Electric and Gas Griddles.* Issue 3, November 1996.

This document pulls from testing done at the FSTC to show that electric is superior to gas.

<u>Electric Power Research Institute Appliance Performance Foodservice Update. *Electric and Gas Convection Ovens.* Issue 4, December 1996.</u>

This document pulls from testing done at the FSTC to show that electric is superior to gas.

<u>Electric Power Research Institute Research Report TR-102743. *Electric Commercial Cooking Appliance Development Needs.* Prepared by Tecogen. August 1993.</u>

This states that the energy use is $12 billion per year in the foodservice industry. However, other data shows similar numbers to the document put together by Pietsch. This document has 1991 marketing data – 732,722 establishments with sales of $284 billion. They forecast industry sales to reach $425 billion by 1997. The forecast did not show any significant shift in market share for any of the major segments. Energy costs are 4-5% of total operating costs. Profit is around 6%. Page 2-2 shows the major market segments with 1991 units, sales, and projected sales for 1992 and 1997. The report has the electric market share for specific pieces of equipment for 1983-1990. They performed a survey on 50 end-users to determine factors that affected the purchase decision and to determine market needs for advanced electric equipment. They were 30 minute interviews. The report also included information on potential advanced electric equipment which could be developed.

<u>Electric Power Research Institute Research Report TR-106841. *A Business Guide to Foodservice.* Prepared by Bevilacqua-Knight, Inc. September 1998.</u>

This document pulls together much of what is spread throughout other reports. While the date here is 1998, much of the data within the report is older – 1996 or earlier. It appears to be a compilation of the earlier documents as opposed to actually updating the information.

The report shows that there are 800,000 foodservice establishments nation wide with sales of $313 billion. Total cost of energy is just 3-3.5% of total sales. There are pie charts of where the energy goes in full-service and fast-food restaurants (p. 6). The report has a section on business needs and electrotechnical solutions. This is followed by a fair amount of information on specific equipment. The report brings up the ASTM testing and says that people should look for that in comparing pieces of equipment. There is a list of published, under review, under development and planned tests (p. 26). The main types of foodservice establishments have their own sections. In each is a description of the business (again information from 1995), energy use, daily load shapes, food equipment typically used, fuel sources for equipment, and needs of the business. Businesses covered are: full-service, fast-food, education, healthcare, and supermarkets.

The last section shows electrotechnology profiles of the equipment discussed earlier in the report.

Electric Power Research Institute Research Report TR-106236. *Market Opportunities in Electric Residential Cooking.* Prepared by QDI Strategies. March 1996.

Not reviewed because it covers residential cooking only and was not relevant.

Electric Power Research Institute. *Foodservice Sourcebook.* Prepared by W.I. Whiddon & Associates, Inc. 1988.

This is some of the oldest information reviewed – 10 years old. It provides names, addresses, and phone numbers of some of the foodservice industry leaders of that time. It also has 1987 sales, units, and % franchise by specific site. Only useful as baseline information.

Foodservice Equipment Reports. October 1996, January 1997 (Vol.1, No.1), July 1997 (Vol.1, No.7) , August 1998 (Vol.2, No.8), November 1998 (Vol.2, No.11).

October 1996 was the first issue of this magazine and it was complimentary to all. There was a piece on the FSTC in this one. – Keating had one advertisement touting the gas energy savings of their equipment, but no ASTM mention.

The November 1998 volume had an advertisement by AGAResearch that marketed their Windows software package of energy costs involved in various equipment options. The results included "ASTM heat-gain data, HVAC, demand charges, everything". However, there were no references to ASTM testing in any of the advertisements in this magazine either. Chose to not review the July and August issue at this time – assuming no ASTM mention will be there either.

ASTM Standardization News. July 1993.

This magazine volume outlines the ASTM cooling appliance performance test methods. The article was written by Don Fisher.

Foodservice Director. September 15, 1998. Vol. 11, No. 8.

Appears to be a bi-weekly magazine dedicated to food and it's presentation. Has a web site www.fsdmag.com which has some trends and statistics information. For example, of three tiers of contractors, there is $16.3 billion volume (assume this is gross sales). There is an increase in sales of around 3% within the sectors they covered (B&I, Prisons, Schools, Colleges, Hospitals, and Nursing Homes) Mainly information about food, not equipment. The few equipment advertisements in the magazine did not mention energy use.

Nation's Restaurant News. November 2, 1998. Vol. 32, No. 44.

This magazine is also devoted to food and its presentation – much in the magazine about point of sale equipment, but not about foodservice equipment.

Electric Power Research Institute Research Report 3544-01. *Foodservice Equipment Applications Handbook.* Prepared by Architectural Energy Corporation. December 1995.

This document covers six equipment types covered (griddles, fryers, broilers, ovens, ranges, and kettles). The information provided indicates the appliance types, cooking processes, market overview (number in use in the country, types of establishments most likely to have them, and sales to different foodservice operations), fuel sources and energy efficiency, technology advantages and disadvantages, and energy and economic analysis. They used FSTC information and EPRI commercial kitchen ventilation research laboratory for the energy and economic analysis. The marketing information comes from a 1989 Equipment and Supply Study performed by the National Association of Food Equipment Manufacturers and "Market Facts 1989" put out by Foodservice Equipment and Supplies Specialist magazine. Restaurant Business, Inc (a major foodservice industry publishers) periodically surveys its subscribers regarding foodservice equipment purchases. Some of the information in this document comes from a 1989, 1991, and 1993 survey. The report also has a listing of the models available by manufacturer for the different types of equipment. There is a (possibly outdated) phone number listing for the various manufacturers as well.

National Technical Information Services, Report DOE/CE/23821—T1. *Characterization of Commercial Building Appliances.* Prepared by Arthur D. Little, Incorporated. August, 1993.

This document has some marketing information on cooking equipment, but is dated (1990). Newer information is available. They also have the status of cooking technologies and where energy savings may actually occur. It gives an idea of the maximum efficiency achievable by the technology.

Natural Resources Canada, Consumers Gas Company, Ltd., and Ontario Ministry of Environment and Energy. *Technology Review of Commercial Foodservice Equipment, Volumes I & II.* Prepared by the Canadian Gas Research Institute and Fisher Consultants. May, 1996.

Volume 1 is a market assessment of the commercial foodservice sector in Canada. It has a section about market characteristics (in Canada) based on information from 1985-1994. While interesting, we don't feel that this information can be used for any California based market characterization. This volume has an overview of performance characteristics of commercial cooking equipment. Volume 2 of this report is a technical assessment of commercial cooking equipment.

19983-84 Fact Book Electric Foodservice Equipment.

Baseline fact book on electric cooking equipment. Lists equipment by type and manufacturer. Can serve as a baseline source for the types of electric cooking equipment offered in 1984 compared to 1998.

25th Edition Foodservice Gas Equipment Catalog, 1996-1997. Copyright CP publishing, Inc.

Catalog of gas equipment by equipment type and manufacturer. Interestingly, none of the manufacturers mention ASTM test procedure performance, even on griddles where the procedure has been in place for seven years.

Preprint of ASHRAE paper. *New Recommended Heat Gains for Commercial Cooking Equipment*. Prepared by Donald R. Fisher, P.E..

Presents an analysis of the loads encountered by commercial kitchen ventilation equipment. Rationalizes a future approach for correctly estimating the size of kitchen ventilation equipment based on use patterns and individual equipment characteristics. Ties approach to availability of ASTM data.

Pacific Gas & Electric. *PG&E Foodservice Technology Center: Strategic Plan 1993-1997*. Prepared by Hart, McMurphy, & Parks, Incorporated, April 1993.

This document is a five-year plan for PG&E's Foodservice Technology Center (FSTC). It contains 6 chapters dealing with a situation analysis, mission and objectives, strategic planning matrix, current research activities, and proposed future directions. While the report in its entirety is valuable, four features merit mentioning. First, the report emphasizes that no other foodservice research project has ever received the broad *national* support represented by the participants on the Advisory Board. Second, the chapter on situation analysis presents some very useful information such as restaurant loads, energy use intensity, how energy efficiency can increase profitability, and conservation potential. Third, the report mentions that the FSTC was given the goal of being a financially self-sustaining facility after 1995. Finally, it is clear that the FSTC has a very comprehensive and ambitious plan to affect market actors throughout the entire distribution channel, both within and outside the PG&E service territory.

Pacific Gas & Electric. *PG&E Foodservice Technology Center Business Plan*. Prepared by PG&E FSTC staff, February, 1997.

This document is an update of the *PG&E Foodservice Technology Center: Strategic Plan 1993-1997*, published in April 1993. The 1997 publication appears to cover much of the same ground, focusing on the same objectives and activities. However, this document provides some new information on the foodservices segment, e.g., utility costs for the commercial foodservice establishments account for 4-8% of the total operating costs, that there are 720,000 foodservice establishments nation-wide, and that there are 0.14 quad of BTU of conservation potential in the U.S. A more thorough discussion of how the FSTC can sustain itself financially has been included. For example, the report points out that over the period 1996 and 1997, the FSTC has relied less on PG&E support and more on support from outside PG&E. This trend was forecasted to continue through 1997.

Rogers, Everett M. *Diffusion of Innovations*. New York: The Free Press, 1995.

This book provides the theoretical framework and the research evidence supporting Roger's model of diffusion as well as introducing new concepts and new theoretical viewpoints. The book reviews and synthesizes 5,000 diffusion publications. Rogers analyzes the limitations of previous diffusion studies, showing, for example, that the convergence model, by which participants create and share information to reach a mutual understanding, more accurately describes diffusion in most cases than the linear model.

Rogers provides an entirely new set of case examples, from the Balinese Water Temple to Nintendo videogames, that illustrate his expansive research, as well as a completely revised bibliography covering all relevant diffusion scholarship in the past decade. Most important, he discusses recent research and current topics, including social marketing, forecasting the rate of adoption, technology transfer, and more. One of the more interesting results of research in this area is that innovations diffuse through a society not as the result of broadcast messages but from direct contact between earlier and later adopters and the example provided to the latter by the former.

Pacific Gas & Electric Company. *Commercial/Industrial Market Effects Baseline Study*. Prepared by Quantum Consulting Inc., July 30, 1998.

This study focused on the packaged air conditioner market and the motors market. The evaluators identified ten market barriers for these two technologies and examined purchase intentions of 400 HVAC and motor end users within and outside of PG&E's service territory, as well as a samples of 15 architects and engineers and 10 ESCOs. They also conducted two focus groups for *each* of the two measures. The primary methodological contributions of this study are: 1) the development of multiple measures of each market barrier leading to increased reliability and 2) the various analyses which included factor analysis of the market barrier questions leading to the identification of seven factors, and the use of structural equation modeling which explores the interrelations among program exposure, perceived barriers, and installation behavior. The analyses revealed that very few statistically significant differences between the PG&E service territory and the comparison area (northern Illinois which had no DSM programs). This is the case in spite of the fact that these DSM programs were focused exclusively on customers in the PG&E service territory and that these programs had existed since the early 1980s. In addition, it was not clear how any of the differences between the PG&E service territory and northern Illinois (e.g., price of electricity, cost of labor, household income etc.) were controlled for by matching regional characteristics. To the extent that they were not controlled for makes any of the reported differences (whether statistically significant or not) difficult to interpret.

<u>PG&E. *Commercial Building Survey Report*. September, 1997.</u>

This is the most recent commercial saturation survey and contains useful information regarding the number of accounts by segment. Also included is energy use and demand, both gas and electric, energy use intensities, end-use sales, year of construction etc. It also encompasses the percent of energy used for *cooking* for each segment. Although the survey was conducted on-site, the level of equipment detail is at the end use level. Thus, there is no information regarding the percent of cooking equipment that could be considered energy efficient.

<u>PG&E. *PG&E Energy Center Market Effects Study*. Prepared by TecMRKT Works, May, 1998.</u>

This study of the Energy Center (EC) focused on participants, those who were exposed to the EC, rather than on non-participants. In addition, no comparison group was identified. The rationale for this approach was that, although a "time-series, cross-sectional" design was clearly the most effective way to attribute any observed effects to the EC, there was no data on the EC over time. Thus, they had to " . . .retroactively establish the effects of an intervention." This means that they asked participants to self-report the extent to which their behavior has changed over time. Because the evaluators recognized that this is a less rigorous approach, they attempted to collect multiple measures from multiple sources (triangulate) of any effects. This study is noteworthy for its re-introduction of diffusion models into the discussion of DSM evaluation. The concept was first introduced in the mid-1980s by SRC, Inc. which had incorporated a family of Lawrence-Lawton diffusion curves into a DSM forecasting model called COMPASS®. The importance of this contribution by TecMRKT Works is that it helps to fill out the theoretical framework begun by Eto, Prahl, and Schlegel (1996). It adds an important social-economic element to our understanding of market transformation.

CADMAC. *Market Effects Summary Study: Draft Final Report*. Prepared by Jane Peters, Bruce Mast, Patrice Ignelzi, and Lori Megdal.

This summary study examined 13 market transformation and baseline studies conducted over the last two years in California. This study reviewed the results of each of the thirteen studies and the methods used to provide the estimates of market effects and sustainability. The summary study provides a very useful list of the methodological lessons learned so that future evaluators can avoid the same mistakes and adopt more promising techniques.

Hart, McMurphy, & Parks, Inc. and PG&E Foodservice Technology Center. *"Proceedings of PG&E Production Kitchen Advisory Group Meetings"*. August 1986 through November 1998.

The Equipoise Team reviews copies of the proceedings for all 26 meetings of the PG&E Production Kitchen Advisory Board, more commonly called the FSTC Advisory Board. The reports were produced by a facilitator from Hart, McMurphy, & Parks, Inc. from 1986 until mid 1993, then the FSTC took over the task of recording the twice yearly meetings. The proceedings serve to document the development and approval of test procedures by the ASTM and the expansion of the technology transfer and outreach efforts. They also document the role that the advisory board plays in guiding the objectives of the FSTC and the transition that has occurred as the industry has entered the era of deregulation.

CADMAC. *Market Effects Summary Study: Draft Final Report*. Prepared by Jane Peters, Bruce Mast, Patrice Ignelzi, and Lori Megdal.

This summary study examined 13 market transformation and baseline studies conducted over the last two years in California. This study reviewed the results of each of the thirteen studies and the methods used to provide the estimates of market effects and sustainability. The summary study provides a very useful list of the methodological lessons learned so that future evaluators can avoid the same mistakes and adopt more promising techniques.

The key findings that emerge by comparing these 13 studies to the Scoping Study framework are:

1. In many cases, the difference between market effects (caused by the program) and market changes (caused by other factors) were not clearly distinguished or applied.

2. The diffusion of innovation model provides a viable counterpoint to the Scoping Study's strict adherence to barriers and economic relationships. The

model focused on information and communication flows, clarifying the human dimensions of how market effects occur and last.

3. Establishing a causal link between targeted market barriers, the intervention and the expected effect was difficult for many authors.

4. There is no test or suggested method for determining what market effect is the best measure of change resulting from any particular intervention.

5. Several studies included a market characterization study, which was effective. Some study authors hypothesized the market barriers in order to fit the framework; in only one case did this approach prove satisfactory.

6. The classification system for market barriers is comprehensive, but the nomenclature is imprecise and distinguishing between categories was sometimes arbitrary.

7. Some authors constructed new barriers with no apparent theoretical basis, and most continued to refer to "first cost" as a barrier despite counter arguments in the Scoping Study.

8. High first cost is a frequent response from market participants that seems to overshadow efforts to identify the "true" market barriers. There are no suggestions in the Scoping Study for how to address this.

9. Finally, there are no specific criteria for lastingness or sustainability of any particular market effect. Those studies that approached the issue in a systematic fashion were most successful in drawing convincing conclusions.

Attachment A

Bibliography of Foodservice Related Documents Reviewed Under the Literature Review Task

1. Electric Power Research Institute Research Report 3544-01. *Foodservice Equipment Applications Handbook.* Prepared by Architectural Energy Corporation. December 1995.

2. National Technical Information Services, Report DOE/CE/23821—T1. *Characterization of Commercial Building Appliances.* Prepared by Arthur D. Little, Incorporated. August, 1993.

3. Natural Resources Canada, Consumers Gas Company, Ltd., and Ontario Ministry of Environment and Energy. *Technology Review of Commercial Foodservice Equipment, Volumes I & II.* Prepared by the Canadian Gas Research Institute and Fisher Consultants. May, 1996.

4. PG&E Foodservice Technology Center, Report 008.1-89.2. *Development and Application of a Uniform Testing Procedure for Griddles.* March 1989.

5. PG&E Foodservice Technology Center, Report 008.1-90.8. *Cooking Appliance Performance Report.* May 1990.

6. PG&E Foodservice Technology Center, Report 008.1-90.30. *PG&E Production Test Kitchen Appliance Performance Report: "Cleveland" Electric Pressureless Steamer.* June 1991.

7. PG&E Foodservice Technology Center, Report 008.1-91.4. *Frymaster® Model H-14 Electric Fryer Performance Report.* September 1991.

8. PG&E Foodservice Technology Center, Report 008.1-90.22. *Development and Application of a Uniform Testing Procedure for Open, Deep-fat Fryers.* October 1991.

9. PG&E Foodservice Technology Center, Report 008.1-91.11. *Appliance Performance in Production: Blodgett Model DGF-50 Gas Half-Size Convection Oven.* December 1992.

10. PG&E Foodservice Technology Center, Report 008.1-94.12. *Development and Application of a Uniform Testing Procedure for a Convection Oven.* October 1994.

11. PG&E Foodservice Technology Center, Report 5011.94.6. *Montague Model V136-5 Heavy Duty 30,000 Btu/h Open Top Gas Range: Application of ASTM Standard Test Method F 1521-94.* October 1995.

12. PG&E Foodservice Technology Center, Report 5016.95.23. *Delicatessen Appliance Performance Testing.* October 1995.

13. PG&E Foodservice Technology Center, Report 5011.95.27. *Custom Electronics Energy Saver Gas Control System for Commercial Broilers.* October 1995.

14. Southern California Gas Company. *25th Edition Foodservice Gas Equipment Catalog.* Copyright 1996.

15. Arthur D. Little. *Opportunities and Competition in the Foodservice Industry.* 1995 Sales and Marketing School, The New England Gas Association. February 10, 1995.

16. PG&E FSTC. *PG&E Foodservice Technology Center Training Seminar: Foodservice Energy Primer.*

17. Xenergy Incorporated. *PG&E Market Transformation Planning Study, Volume 2: Foodservice Technology Center Mini-Study.* June 10,1997

18. American Society for Testing and Materials, *What is the ASTM?* Revised 1996.

19. PG&E Foodservice Technology Center, *PG&E Foodservice Technology Center Training Seminars*, October 1998.

20. American Society for Testing and Materials, *Committee Membership Roster, F26 0600 Productivity and Energy Protocol*, September 25, 1998.

21. PG&E Foodservice Technology Center, *Final Program – Cashing in on Appliance Performance Testing, a Foodservice Equipment Symposium*, May 27, 1997.

22. Foodservice Equipment Reports Tech Report, *PG&E Lines Up Combees*, May 1998, page 68.

23. Foodservice Equipment Reports Tech Report, *Broiler Comes of Age*, May 1998, page 46.

24. Foodservice Equipment Reports Tech Report, *Lab Time! 3 Steamers Take the Test*, May 1998.

25. Electric Power Research Institute Research Report TR-110775. *Electric Utility Marketing Guide to Foodservice.* Prepared by Bevilacqua-Knight, Inc. August 1998.

26. Electric Power Research Institute Technical Assessment Guide. *Volume 2: Electricity End Use Part 2: Commercial Electricity Use.* Prepared by Joseph A. Pietsch. 1992 Edition.

27. Electric Power Research Institute Appliance Performance Foodservice Update. *Electric and Gas Fryers.* Issue 1, August 1996.

28. Electric Power Research Institute Appliance Performance Foodservice Update. *Electric and Gas Range Tops.* Issue 2, August 1996.

29. Electric Power Research Institute Appliance Performance Foodservice Update. *Electric and Gas Griddles.* Issue 3, November 1996.

30. Electric Power Research Institute Appliance Performance Foodservice Update. *Electric and Gas Convection Ovens.* Issue 4, December 1996.

31. Electric Power Research Institute Research Report TR-102743. *Electric Commercial Cooking Appliance Development Needs.* Prepared by Tecogen. August 1993.

32. Electric Power Research Institute Research Report. *A Business Guide to Foodservice.* Prepared by Bevilacqua-Knight, Inc. September 1998.

33. Electric Power Research Institute Research Report TR-106236. *Market Opportunities in Electric Residential Cooking.* Prepared by QDI Strategies. March 1996.

34. Electric Power Research Institute. *Foodservice Sourcebook.* Prepared by W.I. Whiddon & Associates, Inc. 1988.

35. *Foodservice Equipment Reports.* October 1996, January 1997 (Vol.1, No.1), July 1997 (Vol.1, No.7) , August 1998 (Vol.2, No.8), November 1998 (Vol.2, No.11).

36. ASTM Standardization News. July 1993.

37. *Foodservice Director.* September 15, 1998. Vol. 11, No. 8.

38. *Nation's Restaurant News.* November 2, 1998. Vol. 32, No. 44.

39. Pacific Gas & Electric Web Site. *Foodservice Technology Center*.

40. NAFEM Program & Exhibit Guide. *Exploring the Universe of Foodservice Equipment and Supplies*. September 5-7, 1997, New Orleans, LA.

41. *19983-84 Fact Book Electric Foodservice Equipment.*

42. *25th Edition Foodservice Gas Equipment Catalog, 1996-1997*. Copyright CP publishing, Inc.

43. Preprint of ASHRAE paper. *New Recommended Heat Gains for Commercial Cooking Equipment*. Prepared by Donald R. Fisher, P.E.

44. Pacific Gas & Electric. *PG&E Foodservice Technology Center: Strategic Plan 1993-1997*. Prepared by Hart, McMurphy, & Parks, Incorporated, April 1993.

45. Pacific Gas & Electric. *PG&E Foodservice Technology Center Business Plan*. Prepared by PG&E FSTC staff, February, 1997.

46. Rogers, Everett M. *Diffusion of Innovations*. New York: The Free Press, 1995.

47. Pacific Gas & Electric Company. *Commercial/Industrial Market Effects Baseline Study*. Prepared by Quantum Consulting Inc., July 30, 1998.

48. PG&E. *Commercial Building Survey Report*. September, 1997.

49. PG&E. *PG&E Energy Center Market Effects Study*. Prepared by TecMRKT Works, May, 1998.

50. CADMAC. *Market Effects Summary Study: Draft Final Report*. Prepared by Jane Peters, Bruce Mast, Patrice Ignelzi, and Lori Megdal.

51. Hart, McMurphy, & Parks, Inc. and PG&E Foodservice Technology Center. *"Proceedings of PG&E Production Kitchen Advisory Group Meetings"*. August 1986 through November 1998.

Appendix B
Final Key Market Actor Interview and Responses

Interview Guide for Key Market Actor

General

Name ____

Organization ____

Position in Organization____

Profession ____

Years in Profession ____

Period of Time on Advisory Board ________

Market Segment

1. Who do you think is the primary audience(s) of the FSTC?

Market Effects

2. To what extent do you believe national manufacturers have been influenced by the FSTC?

3. What FSTC actions have been most responsible for this influence?

4. On a scale of 1 to 10 with 1 being no influence and 10 being a great amount of influence, to what extent has the FSTC influenced the following market actors?

   Manufacturers _____
   On what do you base your opinion?

   Manufacturers Reps _____
   On what do you base your opinion?

   Designers/specifiers____
   On what do you base your opinion?

   End users ______
   On what do you base your opinion?

   Are there other Key Market Actors that the FSTC influences? ______
   On what do you base your opinion?

5. What are some of the other impacts of the FSTC on the marketplace?

6. On a scale of 1 to 10 with 1 being not at all and 10 being to a great extent, to what extent are the following market actors using performance data to sell or buy their food service equipment?

Manufacturers ____
On what do you base your opinion?
Manufacturer Reps____
On what do you base your opinion?

End Users___
On what do you base your opinion?

7. On a scale of 1 to 10, with 1 being not at all important and 10 being very important, how important is it that these performance claims be based on ASTM test methods? On what do you base this opinion?

8. Why is it that large manufacturers haven't developed any standard testing procedures?

9. Why is it that large end users haven't developed any standard testing procedures?

10. Does the end user believe the claims made by manufacturers, manufacturer reps, distributors, and installers? Why/why not?

11. What is the best way to determine the size of the food service equipment market in Northern California, California, U.S.?

Identification of Market Barriers

First, let me define what I mean by a *market barrier*. A market barrier is any reason that helps explain why cost effective energy efficient equipment is not being accepted in the market place.

12. Do you think there are barriers for end users purchasing cost effective food service equipment that are more energy efficient that typically found? If yes, what are they?

13. Do you think there are barriers for manufacturers producing cost effective food service equipment that are more energy efficient that typically found? If yes, what are they?

14. Do you think there are barriers for manufacturers reps in recommending the purchase of cost effective food service equipment that are more energy efficient that typically found? If yes, what are they?

15. Do you think there are barriers for designers in recommending the purchase of cost effective food service equipment that are more energy efficient that typically found? If yes, what are they?

Organizational Decision Making

16. Who of the following market actors have the *greatest* influence on the end user?

    ___ Manufacturer
    ___ Manufacturer Rep
    ___ Designer/Specifier
    ___ Other

    Why?

17. What are the criteria used by the large food service providers for making capital investments in food service equipment?

18. What are the criteria used by the medium food service providers for making capital investments in food service equipment?

19. What are the criteria used by the small food service providers for making capital investments in food service equipment?

20. What are the various ways by which manufacturers are made aware of the existence and value of more energy efficient technologies?

21. What are the various ways by which manufacturer reps are made aware of the existence and value of more energy efficient technologies?

22. What are the various ways by which designers/specifiers are made aware of the existence and value of more energy efficient technologies?

23. What are the various ways by which end users are made aware of the existence and value of more energy efficient technologies?

24. What are the reasons why an end user decides to purchase cooking equipment?

    (READ: Equipment Failure, change in menu, improve quality, reduce energy use, new construction, new owner, increase throughput, other)

25. What proportion of the food service equipment purchased in any given year is previously owned?

26. Do you think that the local, regional, and even national demand for performance data on cooking technologies and ventilation by end users, distributors/installers, and manufacturers will ever grow to the point that the FSTC could become financially self-supporting?

___ Yes
___ No
___ Don't Know

Why do you say that?

Sources and Uses Diagram
Key Market Actor Interview Instrument
FSTC Market Effects Study

Questions	Demographics Firmographics	Market/Market Segments	Structure of Market		Market Events that Trigger Interaction	Magnitude of Market
			Market	**Barriers**		
Introduction	X					
1		X				
2			X			
3					X	
4			X			
5			X			
6			X			
7			X			
8			X			
9			X			
10						X
11				X		
12				X		
13				X		
14				X		
15			X			
16			X			
17			X			
18			X			
19			X			
20			X			
21			X			
22			X			
23					X	
24					X	
25						X
26					X	

Q1 What do you think is the primary audience(s) of the FSTC?

Category: Association

More and more it is the large regional and national chains, and some manufacturer have used it. In the past, the focus was more on PG&E customers. This change in focus is a change for the good.

1) Utility customers, i.e., restaurants, hospitals, schools (ultimate beneficiary), 2) Mfgrs (developing test methods, show off their stuff and comment on methods, 3) other utilities

Category: Consultant

First, the manufacturer. Second, equipment specification and supply side, to a limited extent chain operators.

User audience, I.e., people who want to have a piece of equipment demonstrated, Second, people who want serious testing of specific pieces of equipment.

Both the manufacturers and the end users

Currently - A fairly narrow group of equipment R&D specialist. This includes advisors and technical people. Procedure development personnel. Manufacturers only on ASTM F-26 panel, not on board.
There ought to be manufacturers on the board.

Bettie: 1) Manufacturers first, 2) ASTM, 3) the customers especially national accounts, and 4) designers and specifiers.

Category: End User

Restaurant operators and their design departments. They work to help the layman with purchase decisions. They help set the standards for measuring the efficiency of the equipment.

Chain restaurants. They are sophisticated in equipment purchasers. They have the money and understand advantages of energy efficiency. They are interested because it means money saved.

Category: Manufacturer

Purchasers of food service equipment

Category: Publication

Three potential markets. Utilities, manufacturers, operators (endusers) primarily chain operators.

Category: Trade Association

Various. Primary food service customer, secondary is industry trade allies.

Now, it is the chain operator. In future, because more equipment will be sold by people not equipment knowledgeable (e.g. SISCO et al.) and high rates it will be large independents.

Q2 To what extent do you believe national manufacturers have been influenced by the FSTC?

Category: Association

See q. 4.

See question 4

Category: Consultant

See Q 4

Not much. Sense that they have their own testing facilities. Documentation from their tests don't go into either productivity or energy efficiency.

The manufacturers who have equipment of the type for which test procedures have been developed have been effected. The others no. Reliability is the key to the chains. There are many players in the market but the upper half of the market both regionally and nationally is represented by six large manufacturers

Very Little.

The Center is on the crest of a wave. The larger manufacturers realize that big accounts will soon demand performance data.

Category: End User

In the past one to one and a half years they have had a great deal of influence. Before that they didn't have the vehicle to get the information out. They tried developing their own report first, then they developed their relationship with Foodservice Equipment Report, which allows them to get out good understandable reports that are easy to read. Prior to

See 4a below.

Category: Manufacturer

See question 4 below.

Category: Publication

Fairly influential

Category: Trade Association

Escalated quite a bit over the last couple of years.

ASTM methods; forcing all mfgrs. To at least test equipment buyers will be able to distinguish. National standards? No a standardized test method.; anyone who ignores will do so at their peril.

Q3 What FSTC actions have been most responsible for this influence?

Category: Association

See q. 4.

See question 4

Category: Consultant

Association with Foodservice Equipment Report, don't know because I haven't had any contract with them in the last five years.

Don't know.

Test Development. Seminars attract both endusers and manufacturers. Reports are helpful. The Web site also.

There is no direct incentive for the manufacturers, most equipment is not sold on energy efficiency. Most equipment is sold on price and features. Only way to increase pressure on manufacturers is "pull through" from chains. A few manufacturers are connected into the test methods.

The Center's development of standard methods and their eventual adoption by ASTM. One of the keys is that the center is fuel neutral. Also, working with national advisory groups and educating manufacturer reps. The food and equipment reports, kitchen Monitor, work with the CEC/CPUC. Educating management at PG&E.

Category: End User

As stated above, they have developed standard test methods, and tested equipment, but more importantly they have found a credible well written method of communicating the results. (He had one right on the top of his stack of mail). Previous one was written by technicians for technicians.

Understanding who will be interested. The FSTC has marketed to the interested parties, the chains.

Category: Manufacturer

They have tested equipment and supplied good comprehensive reports.

Category: Publication

Publicizing what they have done, marketed it fairly well. Second, they have credibility because they have succeeded in delivering credible tests methods and credible test results.

Category: Trade Association

ASTM test procedures development and the exposure that they have gotten through it. Also through the exposure that they have gotten through the Foodservice Report. I see more and more manufacturers advertising based on ASTM test procedures.

ASTM testing standards; duel fuel utility gives it the needed objectivity.

Q4 On a scale of 1 to 10 with 1 being no influence and 10 being a great amount of influence, to what extent has the FSTC influenced the following market actors?

Category	Manufacturers	On what do you base your opinion?
Association		
	6	It is just beginning to have influence. KFC is an example of a large chain influenced by the FSTC requiring manufacturers to provide performance data. Some manufacturers have no idea.
	3.5	Note that this is not an indication of PG&E's efforts. Rather it is a reflection of society and regulatory the world in which energy efficiency is simply not that important. Thus, very few are interested in efficiency.
Consultant		
	6	It has taken some time for the manufacturers to discover it. Magazines, specifically Food Service Equipment Report, has done a good job of communicating the results of the FSTC.
	2-3	Haven't seen much evidence of it. Tests methods allow manufacturers to compare their equipment against their own and other equipment manufacturers
	2	No direct incentive. I speak from my experience with manufacturers. Manufacturers are not very aware of test methods. Not sure that it is even PG&E's roll to effect the manufacturers nationally. The FSTC needs to use the Advisors to identify correct audience and decide if that audience should be national.
	10	The development of standard testing methods.
End User		
	8	For the past year and a half they have been able to communicate the through the Food Service Report. Hasn't seen an increase in manufacturers reporting it because there are only conferences every two years, and it hasn't worked its way through the process yet. Expects to see many more exhibitors at the upcoming conferences presenting results based on the ASTM tests.
	5	National manufacturers are influenced by price. Gives them more information to decide on the best piece of equipment. Chains see the advantage of money saved.
	6	Our industry is one that lets the market decide what to buy. We are a market driven organization. Manufacturers have considered the test results and reports, and upgraded equipment to be sure that they get good test results.
Publication		
	3	8.5 in terms of credibility. Most manufactures see the center as credible independent and fair. 3 in terms of use of test data.
Trade		
	6.5	Direct input from manufactures. 50 equipment manufacturers are members of our association. We get a lot of feedback from the manufactures. Credibility of claims has come up a lot in the last 5 years, because of participation with us and Foodservice Report.
	3.5	Just beginning to influence mfgrs. Eventually will be able to understand competitive advantage.

Q4 On a scale of 1 to 10 with 1 being no influence and 10 being a great amount of influence, to what extent has the FSTC influenced the following market actors?

Category	**Manufacturers Reps**	**On what do you base your opinion?**
Association		
	8	In California, the influence is an 8. Outside California, the influence is only a 3.
	4.5	Note that this is not an indication of PG&E's efforts. Rather it is a reflection of society and regulatory the world in which energy efficiency is simply not that important.. The manufacturers reps are somewhat more influenced simply because they have the incentive to promote the efficient equipment in the trenches. Therefore, they can get a little more excited.
Consultant		
	2-3	Maybe some reps in Northern CA have been affected, but not else where.
	5-6	Reps in the area have been to the lab.
	2	No effect for most. They act as a conduit back and forth between customer and manufacturer.
	2-6	Local reps 6, reps not in PG&E territory 2, Can't think of any outreach that has addressed the non PG&E territory representatives.
	9	Within PG&E's service territory, the influence has been greater. Outside, the influence is an 8. The reps sometime come to the Center when equipment from a particular manufacturer is being tested. Many reps have been exposed through training, often sent by the manufacturers.
End User		
	6-7	Don't have direct experience but have heard from other chains. They don't have the sales tools yet but that will work its way through the system. Once one starts offering test results then others will follow.
	NA	don't know
	-	Don't know
Publication		
	1	They don't see independent tests as anything but a threat. The tests undercut their ability to sell whatever they want. Dealers are similar because they only have a couple of brands. (note: he separates reps and dealers)
	4.5	Mainly in the PG&E service territory or west cost (higher), lower else.
	5	Using performance data to make sale; His piece equipment looks good.

Q4 On a scale of 1 to 10 with 1 being no influence and 10 being a great amount of influence, to what extent has the FSTC influenced the following market actors?

Category	Designers	On what do you base your opinion?
Association		
	8	In California, the influence is an 8. Outside California, the influence is only a 3.
	3.5	Note that this is not an indication of PG&E's efforts. Rather it is a reflection of society and regulatory the world in which energy efficiency is simply not that important. Thus, very few are interested in efficiency. They must react to what customers want. Restaurant owners don't care because cost of energy for food services not very large(as a percent of the total energy for a restaurant. Moreover, some of the customers, especially fast food, are more interested in productivity and throuput than in energy. They often tell the customer up front about the specification of the equipment. However, the specifications focus on throughput rather than energy.
Consultant		
	3-4	Foodservice Equipment Report probably gets read. I read it
	1-2	Don't think that consultants are doing that kind of testing. Dealers that don't have their own showroom would use it. Percentage with show rooms is increasing (30% have their own but do 20% of business)
	2	Too early. In house specifiers are being effected. The large independents are not being effected much. The small independents not at all. In general energy consumption is way down the list for all in terms of equipment purchase criteria
	2-6	Local reps 6, reps not in PG&E territory 2, Can't think of any outreach that has addressed the national designers.
	6	The problem is that it is not clear whose job it is to educate the customer regarding energy efficiency. The designers/specifiers should be responsible for educating the customers regarding cost-effective, energy efficient equipment. Specifiers are probably a little better informed within CA.
End User		
	4-7	4 for designer broker. We use designer/broker to which we specify the equipment. Consultants have the potential to be 8-9. But they do not currently have the information.
	6	I hear more designers specifiers talking about it today when we have our multiunit groups.
Manufacturer		
	4	Especially when they are comparing different brands that they are considering in a bid.
Publication		
	8	Because their job is to offer customers best value for money. So they care a great deal about what is best. They care about all the results. They are the most sophisticated user of the test data..
Trade		
	6.5	Outreach to designers specifier has been expanded in the last 2 years. One of the major designers on the nationwide basis just reported results based on an ASTM test procedure.
	5	Are getting pressure from clients. Nationwide.

Q4 On a scale of 1 to 10 with 1 being no influence and 10 being a great amount of influence, to what extent has the FSTC influenced the following market actors?

Category	End Users	On what do you base your opinion?
Association		
	9	End users are somewhat aware. However, outside of California the influence is much lower.
	3.5	Some customers have become very aware of the Center. For the most part, it is the larger chains and the decision makers that recognize the benefits. They can make requirements of suppliers to get equipment tested. Only certain chains, such as Safeway, are in a position to recognize these benefits. May happen more with chains but small owner may not have gotten the message (ARA should help).
Consultant		
	2	Typical end user more interested in the end result. Interested in delivering food product. If it works he doesn't care about performance of it. Relies on supplier to give equipment he needs. Energy consumption is a small part of costs so he doesn't worry about it. Food cost or labor more important. Supplier probably still ill informed.
	4-5	But really don't know to what extent that the users are going to the FSCT. Depends on who. Large chains, yes. Small guy, no.
	2-6	Local reps 6, reps not in PG&E territory 2, Can't think of any outreach that has addressed the national end users.
	8	The Center has had a lot of influence on the large national accounts. These larger customers are very sophisticated when it comes to energy efficiency. On the smaller independents, the influence has been much less.
End User		
	8-9	We have had representatives from the FSTC address MACO on equipment and exhaust hoods etc. So these guys have a keen interest. It directly effects our construction and operation costs.
	3-7	7-8 for chains, 3-4 for individuals. Again, chains are more sophisticated, and understand money savings better.
Manufacturer		
	3-7	West coast and CA = 7, the further away you get the less influential they are. The east coast = 3.
Publication		
	7-8	Depends on who you are talking about within the organization. There are purchasing people and there are the people who care about performance. Purchasing group are big proponents of "value engineering". They want high end Fords. They get paid for minimizing capital costs.
Trade		
	7	All segments. Good success stories with McDonalds and Safeway. End users have become really familiar with the ASTM test procedures. FSTC has done case studies and promoted them.
	5	End user in chain influenced by designers/specifiers; independents:larger (their asking for demonstrations-3.5); very small (0) still based on cost - used market)

Q4 On a scale of 1 to 10 with 1 being no influence and 10 being a great amount of influence, to what extent has the FSTC influenced the following market actors?

Category	**Are there any other key market actors that the FSTC influences?**
Association	
	Other utilities (gas or electric) have been very interested in and out of California. They request test reports and articles and often site them.
	None
Consultant	
	None
	None.
	not asked
	R& D organizations. EPRI, GRI, AGA labs, ADL, somewhat for Battel. Aware from EPRI and GRI as cofunders and RFPs have used test methods. Also DOD, DOD is on F-26. DOD has a stated position of using ASTM test methods as a replacement for Mil Specs. This will probably be seen in full in the future. Up until now they have not specified test methods.
	School districts, health care, and the ARA.. Schools are definitely paying attention.
End User	
	None
	No. One other is regulatory, but it plays a minor role overall.
Manufacturer	
	The federal government. They have developed standards. Standards based on the ASTM tests are now being used to purchase equipment and the ASTM tests (he called them standards) include performance specifications.
Publication	
	No
Trade	
	Trade associations, us and the AGA. Least effective with American School Foodservice Association, but it may not be worthwhile. Aware of it by participation in the industry. Aware that they participate in FSTC and other industry panels.
	None.

Q5 What are some of the other impacts of the FSTC on the marketplace?

Category: Association

None.

Don't know

Category: Consultant

My personal opinion is that Foodservice Equipment Report has had a greater impact than any other. The earlier Kitchen Report didn't work. I don't know why.

University foodservice management schools, e.g. cal poly, chef schools, etc.

Energy Star could come to the food industry as a rating standard

Strong influence on restaurant energy efficiency. TEEM project with McDonalds. McDonalds as a market leader with others copying them. Similarly with Safeway, emulation.

Don't know.

Category: End User

Technical Societies. ASHRAE will be effected eventually, we are very concerned about HVAC losses do to ventilating conditioned air. Also the National Sanitation Foundation (NSF) specifically cold pans. New codes are going to push the industry.

The restaurant industry moves very slowly. Changes come slowly. As energy prices have fallen this issue has taken a back seat to food safety.

Category: Manufacturer

Test reports and feed back on high tech equipment that has been recently developed, use in promotional material. Test report can be used to promote product. Frymaster has use the FSTC to test a Fat fryer. They were interested in the steam griddle plate test report.

Category: Publication

no

Category: Trade Association

Educating the industry at large, educating other utilities even. They have been a major player in making utilities aware of advantages of energy efficiency in food service. EFSC holds annual conference at FSTC, AGA also doing the same now. Affect on the ASTM codes and standards. Ventilation is now becoming important.

Q6 On a scale of 1 to 10 with 1 being not at all and 10 being to a great extent, to what extent are the following market actors using performance data to sell or buy their food service equipment?

Category	**Manufacturers?**	**On what do you base your opinion?**
	6	Some are, some aren't. If a manufacturer's don't test doesn't turn out favorable, then they won't use the results. For example, none of the also-rans are using it. Poor results would be used as a point of comparison to improve their equipment.
	5	Don't know for sure. Probably affected by Center.
Consultant		
	7	Today the manufacturers are beginning to realize that their performance is a greater selling tool than it used be. Historically there was no way of legitimizing performance.
	7-8	All of the cut sheets that we use. Mostly tested but not against the standardized test.
	7	But the data is not standardized. Most use data in their catalogs an literature, but it is not standardized. FSTC has added a measuring stick to the industry.
	2	Literature, restaurant shows.
	8.5	If the performance data are favorable, then the manufacturers will use it to sell. If not favorable, then they will suppress the information. At the very least, they use it as a benchmark against which to measure their improvement.
End User		
	Low	Don't know how they are using it. Haven't seen anyone using it. It is still working its way throughout industry.
	7	Price is still the most important. Manufacturers can't sell higher performance. All of the other parameters such as will it fit, will it fit my need are more important.
Manufacturer		
	2-9	Depends on audience: general market = 2. Major chains = 8-9. Chains care about test results, small buyer only cares about first cost. Federal government = 1. Large manufacturers cannot do business with the federal government because they give preferences to the small manufacturers. Thus using performance data to "sell" equipment is low.
Publication		
	5	Through exposure to literature. The adds don't show it.
Trade		
	7.5	Because they know that they are going to have to put some kind of stamp of credibility on their equipment. This does that. Info will assist the food service customer. Productivity is the main input, gives them a qualitative way of rating the equipment. Efficiency is secondary. Gives the customers a sticker similar to cars.
	3	Often use data but using their own data rather than the Center's (85%) and their own test methods show their own equip. in best light.

Q6 On a scale of 1 to 10 with 1 being not at all and 10 being to a great extent, to what extent are the following market actors using performance data to sell or buy their food service equipment?

Category	Manufacturer Reps?	On what do you base your opinion?
Association		
	6	Some are, some aren't. If a manufacturer's test doesn't turn out favorable, then they won't use the results. For example, none of the also-rans are using it. Poor results would be used as a point of comparison to improve their equipment.
	5	Don't know for sure. Probably affected by Center.
Consultant		
	2	Has not yet been discovered as a selling tool. Manufacturers reps are not highly motivated, they sell what is in their manufacturers line.
	8	They come in and talk to us about it.
	-	Only as an assistance for the buyer
	1	They are the people that man the booth at the restaurant shows. They are the least technically oriented. Shift around a lot amongst equipment types.
	8.5	
End User		
	Low	Don't have the literature yet. At this point, to the best of my knowledge, which is limited, they are not using performance data. I haven't been exposed to any who have been using performance data.
	5	They use it less because they are closer to operator who want lower price.
Manufacturer		
	3	As a general rule the reps try to tell a story, selling to ma & pa & dealers, so cost is first priority, performance data not considered.
Publication		
	2	They sell on the street on performance but not using independent sources.
Trade		
	5.5	They don't get out there and utilize the test results as much as they should. Not as aware as much of the rest of the industry. The dealers and reps really don't influence the market. The manufactures reps are more market influences than the dealers
	5	Center influencing; Greater influence in state because of geography.

Q6 - On a scale of 1 to 10 with 1 being not at all and 10 being to a great extent, to what extent are the following market actors using performance data to sell or buy their food service equipment?

Category	**Designers?**	**On what do you base your opinion?**
Association		
	DK	
	5	Don't know for sure. Probably affected by Center.
Consultant		
	5	They have a greater passion for the item that performs well. Manufacturers rep is only trying to sell what is in their bag of tricks.
	2	2 designers, Dealers 6-7, they are trying to sell a brand.
	-	Only as an assistance for the buyer
	1	Presumption more than personal knowledge. General input from the process. Designer/Specifier trade organization is sort of elitist. One of a kind designs limit influence of energy efficiency. Chef has primary influence Even true of large organizations.
	?	
End User		
	Low	Literature not there for reps or designers, so same.
	6	They do it for the ones who want better equipment. Chains. It is mainly the chains who use specifiers.
Manufacturer		
	4	They tend to specify equipment with more emphasis on performance because their reputations are on the line.
Publication		
	1	Performance issues are irrelevant to them. They don't sell anything on that basis. Not a single dealer. They sell on the cost.
Trade		
	6.5	I expect this to increase in the next couple of years. Education and publication are now starting to take hold. The organizations that weren't partners didn't have the info. Now it is really increasing.
		Moving toward it fairly rapidly - see above rating

Q6 On a scale of 1 to 10 with 1 being not at all and 10 being to a great extent, to what extent are the following market actors using performance data to sell or buy their food service equipment?

Category	End Users?	On what do you base your opinion?
Association		
	DK	Largest end users use and some even demand it
	DK	Chains are more apt to want to see that information than small restaurants. Note that the respondent indicated that there were probably no differences by state with respect to the influence of the FSTC for any of the market actors.
Consultant		
	3	We that provide product. We haven't done a good enough job of teaching them about value of performance of equipment
	4-5	Gut feel. Mostly product requirement and cost. Some brand loyalty. Experience.
	DK	Only the big chains are using performance data. For modest size on down first cost is the biggest driver.
	2-4	Non chain 2, chain 3-4. The chains pay more attention to costs and have the margin to address the issue.
	8.5	Only the sophisticated large accounts are using performance data. The large national accounts are the drivers. The value of such performance data will eventually trickle down to the smaller customers who will become better educated.
End User		
	Low	Literature not there for reps or designers, so the customers can't see it either. I look it as the next step in the standards process. Of all of the test that have been done, don't know how many have been "certified". Once one manufacturer starts claiming results based on standard tests all of them will. I expect to see a lot more in the show this spring.
	4	Chains are about 8, individuals 3. Contact with our customers. We represent about 30% of the restaurateurs in the market.
Manufacturer		
	2-9	Chains = 9, small rest =2. Chains care about test results, small buyer only cares about first
Publication		
	7	What really drives the market is capital costs. (Organizational practices, misplaced incentives). High capital expense industry. Chain dinner house is 2.5M investment. They will only sell 2.5M in first year. They wear out fast. Has a life of 5 years. Means that they want to keep capital costs down. All these companies are public, so they try to keep the asset cost down to keep ROI looking good.
Trade		
	7	They were looking for data/information. Three major fast food chains are now on board, have all been through some type of ASTM experience or FSTC experience. Will have less effect in the smaller users. But again they will imitate them. The main driver is production, first cost less important than price. Labor shortage now effecting choice the equipment (I.e., the equipment needs to contribute to production since labor is limited).
	See above	Larger the chain the greater the demand; 6.5; smaller 2.5;

Q7 On a scale of 1 to 10 with 1 being not at all important and 10 being to a very important, how important is it that these performance claims be based on ASTM test methods?

Category	**Importance**	**On what do you base your opinion?**
Association		
	10	It is crucial in order to establish credibility.
	DK	Depends on whether the person requires third-party data. Manufacturer and their reps will use data that makes their equipment look good. If savvy to third party, may or may not share this information. The playing field will eventually be the same in all states.
Consultant		
	9	There has to be a baseline. There has to be a legitimate basis for the test itself. Has to be reproducible.
	3	For the most part the people don't care that much, not meaningful. Production data is important 7-8.
	-	-
	8	To dispel bogus claims. The industry was un-benchmarked before the standard procedures were developed.
	10	It is absolutely essential .
End User		
	10	Food equipment is a natural extension of the ratings of air conditioners and water heaters. Given the large load represented by food equipment it is paramount.
	1	Most don't understand that there is no standard upon which the claims are based.
Manufacturer		
	5	Chains currently have own standards and specifications. Federal government cares a lot. General buying public doesn't care, only first cost matters.
Publication		
	2	Most of don't know what the ASTM is.
Trade		
	9	The ASTM procedures are the only basis that they have in the market. Gas and Electric industries have both accepted these procedures.
	10	Absolutely essential.

Q8 Why is it that large manufacturers haven't developed any standard testing methods?

Category: Association

Internally, they have a test procedures for cooking quality. However, they have no energy concerns. PG&E is less concerned about food quality than with energy use. Cannot address all the possible issues associated with food quality. That is, each restaurant has its own unique standards of food quality (e.g., pizzas). PG&E does do product quality. PG&E doesn’t address reliability.

The short period of time that they have to bring a concept to market doesn’t bear heavily on running that kind of test. In addition, they probably have developed some of their own testing procedures especially when the customers have demanded that kind of information.

Category: Consultant

Their perceived cost/benefit ratio. Ten years ago, mfgrs didn't care about energy consumption and true performance. Least cost was the basis for most equipment sales. Now manufacturers are looking at performance as a way of gain market share. This is especially true for the manufacturers that doesn't see itself as the low cost provider. Acquisition is moving the market to bigger chains, bigger chains go for value over first price.

No reason to. The industry has grown so fast that there are lots of buyers. Still a cottage industry. Not very sophisticated. Other issues that are more critical.

No one manufacturer could afford to develop the tests.

First, equipment is not sold on energy use, it is sold on other features. Second, within the US foodservice industry, manufacturers are not very close to customers. There are many layers between he customer and the manufacturer. Many end users are not even asking about energy efficiency. Productivity side of the test method could have been used better to influence the market, this parameter makes a difference to the end user. Energy not on map as far as purchase criteria are concerned, productivity almost not on map, uniformity of product is a key decision parameter. May want to refocus FSTC efforts in future to focus more on productivity in selling value of ASTM procedures.

They have such testing methods in house; some are good but can produce biased results. They do not want competitors to know how they tested it.

Category: End User

Aren't many large manufactures. Only two large ones. Most are less than 20-30 million per year. No one manufactures have the resources to do it. Limited turn over. Low on their priority give what they want to do.

Some of them are under heavy price pressure, and it adds to the cost. Some don't want it for economic reasons.

Category: Manufacturer

We have. Standards are the requirements of the customer. Keep them in house. Major purchasers buy based on their experience.

Category: Publication

Nobody forced them to. They haven't had any pressure to develop. We are talking low tech. Venturi burners are 100 years old.

Category: Trade Association

Why would they. They don't want it. It is a cost and a burden. Driven by customer needs.

Never had any really large manufacturers that were dominant in the marketplace; mostly regional; few national brands. This is beginning to change due to mergers; do what serves them best. They will eventually move toward ASTM for marketing purposes.

Q9 Why is it that large end users haven't developed any standard testing procedures?

Category: Association

They do, but they have little to do with energy. They bake to the gold standard. They conduct extensive testing but could not transfer the results to other competitors. Too customer-specific. They will welcome energy standards.

Probably don't have the staff to devote to such a low priority issue, e.g., some chains used to have staff do performance tests but are not doing it in-house as much because the cost of full-time staff is prohibitive. Smaller customers simply don't have the staff. If a third party tests their equipment, they willcare about the accuracy and validity of the resulting test data.

Category: Consultant

Historically they have looked to outside sources for that information, utilities and UL.

Feel they shouldn't be doing it. Or they don't need to. In reality they test and compare. They don't develop a generic test. They don't want to develop a test and pass it on to someone else. They would like to reference a test but they don't want to develop it.

Because they could get the data for free by asking for it. They set performance specifications.

End user purchase decisions are more driven by performance, controls, size/space requirements. Most chains don't pay utility bill or pay for equipment. The franchisee pays for these things. Chains and franchisees are sensitive to first cost. Operating cost are not an issue to them, it pales compared to labor which is a much bigger problem for them.

Some have (e.g. McDonalds). It helps to benchmark. It is considered proprietary and not shared with public.

Category: End User

McDonalds goes beyond that. They develop specific equipment with the manufacturers. Only 10 or so chains would have the resources. The other factor is why should I? We want the results but don't want it to cost us any money.

Some have, but not a lot. They are not sophisticated enough in their equipment purchase. They are moving in that direction. Because it is an entrepreneurial business sector, things move slowly.

Category: Manufacturer

There were tests at one point in time ANSI. They had five standards including performance tests. The performance tests were inadequate. They were tailored for residential equipment. Generally purchasers today are focused on safety. They have confidential test procedures. Won't put them out to the market because they don't want to give up the advantage.

Category: Publication

This is a semi custom industry still. They want a test that meets their parameter. Each large chain goes out and gets what they want. Profit margins are high enough that squeezing the last bit out [via fuel efficiency] isn't key. Kitchen equipment is a small part of the overall operation costs. This is changing in the last couple of years.

Category: Trade Association

Some have (McDonalds, KFC, etc.) but they have limited knowledge about how to develop a broad test method. They put their effort where their money comes from.

McDonalds has its own center and has developed its own testing methods. However, these methods are proprietary. McDonalds is an advocate of energy efficiency. Are their testing procedures just as good as ASTM? No, since they didn't test the full range of equipment and therefore have not addressed the full range of measurement problems.

Q10 Does the end user believe the claims made by manufacturers, manufacturer reps, distributors, and installers? Why / why not?

Category: Association

No. However, this should change in the future.

End users have probably concluded that they can’t trust the manufacturers' performance claims.

Category: Consultant

If it is verifiable, like if it is based on standard tests with comparisons. Without a verifiable basis, no they don't believe it.

Getting better. Our industry is 50% of the way to being professional.

The bigger they are the more skeptical they are about performance claims.

If quoted in the context in the ASTM, yes. If not quote in ASTM terms, maybe. The ASTM procedures have been around awhile so they are starting to penetrate their consciousness. Case studies are the missing ingredient. The Deli report is top on my list as a believable study.

The end user was at their mercy until the ASTM adopted standard testing methods. The results of equipment test using the ASTM testing methods are more credible.

Category: End User

No. All make a lot of claims. Are trying to sell the flash. Don't see comparison in the market. Comparisons are not well founded if they do.

Yes, don't believe everything, but they do believe a lot of it. To some degree they don't even believe what the FSTC publishes. The industry is skeptical lot.

Category: Manufacturer

Think they are skeptical. I believe 50% rely on experience to make buying decisions.

Category: Publication

No. They think that they are just flogging equipment. They don't think that there are independent tests. They ould love to see a consumers report type of magazine. But other than chains most operators don't care about equipment. It is just a tool. Chef has influence in fine dining. Corporate chefs have some influence in hotel and multi facility applications.

Category: Trade Association

Five years ago they did. They don't anymore. Don't accept it unless it is based on a standard procedure. And proof. This comes from the heating up of the competition in the Food service industry. Profitability becomes more important. Have to have best equipment.

Everybody is skeptical since all information is self-serving. They will become more trusting when they fully understand the ASTM and the objectivity that it brings to the market.

Q11 What is the best way to determine the size of the food service equipment market in Northern California, California, US?

Category: Association

Don't know.

Don't know

Category: Consultant

There are several publications that annually produce estimates. Conners is one. For localized information go to the regional restaurant associations. Other similar industry organizations for hospitals, prisons etc. This data is no big secret anymore.

Go to the publishers that do reports that are constantly reporting figures. Food Service Report is a good source. Another good source is the associations. Their information comes from participants. Might try the California Restaurant Association for California data. They don't cover other areas.

Talk to the manufacturers to find out what they are selling. GRI and EPRI may have data, utility reps may well know. No difference between California and the rest of the US.

Nationally, ask Robin Ashton, Conners publishing sells data, Ashton will know about it's availability. NAFAM possibly (Greg Richards, educational director), he has been around in various posts and he may know where to get the data. California: Gerry Breitbart, or PG&E may have the data (Bette Davis may know).

Surveys; reports.

Category: End User

Contact NAFAM. Greg Richards 312-644-6610. He is the VP for Education. Also the Europeans have a similar organization. That is a potential reason that the US manufactures should be getting on the bandwagon. They could use it as a barrier to keep out the competition. The Europeans have good equipment.

We do statistics, # of restaurants, will send. For California I recommend the California Restaurant Association. They may have California specific data.

Category: Manufacturer

Marketing data available. He will call back with data or where we can get it.

Category: Publication

Manufacturer dollar sales 4.5 billion dollars/per year (us) plus a billion for export. No one reports unit shipments, Conners couldn't do it. Technomics says there are 773,000 individual units in the US, 600 to 800 equipment manufactures. Several companies that supply highly detailed market analysis stuff for chains. He doesn't know who they are anymore.

Category: Trade Association

of customers NRA 799,000 plus. Latest NRA report. Will send us the send info. Extremely hard to get. They get it from the US Department of Commerce. Takes 3-5 years to get. She can get us that. Doesn't know how to get California information.

Growth of industry; replacement market growing driven by consumption;

Q12 Do you think there are barriers for end users purchasing cost effective food service equipment that are more energy efficient that typically found? If yes, what are they?

Category: Association

Organizational practices. For example, McDonalds has established procedures. Training is conducted for specific food production processes. Such a momentum is difficult to overcome. They already have recipes, a particular, and equipment parts.

Yes. They lack trust in the manufacturer's testing. Even if the end user could trust the manufacturer, they could not trust that they used the same procedures. If the manufacturers used a common standard, one would always wonder whether they cut any corners in applying the common standards.

Category: Consultant

Greatest barrier is that if energy efficiency is the goal in purchasing equipment, then energy costs are just not a major cost to the end user, so it is not important to them. If it can be energy efficient and save in food or labor costs, then you have an easier sell. Net gain in cost savings pretty minimal.

First cost, Fuel efficiency is not on the map. Lack of information. Buyer is trying to minimize first cost,

Price is the barrier, all else being equal.

Real barrier is emphasis on things other than energy efficiency. Price/performance across a wide range of features.

There are few barriers for the large sophisticated buyer. Energy efficient equipment is not correct for everybody (the payback may be too high).

Category: End User

Yes. #1 Cost. New improved equipment always costs more. Return on investment is our criteria (organizational practices) and the first cost always controls building cost, but I don't take into account savings over time.(spit incentives). Different for replacement equipment. There I have the freedom to take into account savings over time.

Price. Communicating the value of a piece of equipment. Information not well communicated. They don't believe it. The up front cost to a restaurateur is always a big factor. Size and availability are also issues. If it is larger then it is less attractive. If it is hard to get then it is less likely to get in. For chains, national availability is important. Energy efficiency comes last on the list.

Category: Manufacturer

Yes, First cost. One of key ingredients is market volatility. Customers immediate investment is usually tied to survival, so they minimize first cost at all costs. Only established restaurants can look at energy efficiency, because they can look at the cost over time. Second, reliability, food service provider currently have the perception that energy efficient equipment is not as reliable as standard efficiency equipment. Third, cost of the product over its life, I.e. payback. If service costs are higher then lifecycle cost is higher. Reliability is critical.

Category: Publication

Yes, sellers have not done an adequate job of convincing operators or payback. Willing to sacrifice operating cost for short term reduction in capital cost (overall, cooking only a small part of the overall capital cost). The growth rate of the chain is important in today's market so they would rather put extra funds into growth.

Category: Trade Association

Yes. For the mom and pops it is capital cost (difficulty in getting financing due to high failure rate in industry). They focus on production as opposed to the cost of energy efficient. (inseparability of features).

Lack of awareness. This lack of awareness has been partly created by PUC by cutting utilities budgets and thus their ability to put people on the street. The utilities are more trusted than equipment. Sales personnel. The large customers can take care of themselves. However, the small and medium end users must depend on utility for information.

Q13 Do you think there are barriers for manufacturers producing cost effective food service equipment that are more energy efficient that typically found? If yes, what are they?

Category: Association

It difficult for manufacturers to interest end users in energy efficiency since energy cost is small fraction of operating costs. However, large chains may be more open to such a pitch.

Customers often specify features of equipment that are inherently not energy efficient, e.g., throughput more important than efficiency. The market is customer driven. That is, manufacturers must respond to customer wants and needs.

Category: Consultant

Similar to the end users, not a hue and cry for more energy efficient equipment. They are concentrating on safety, and food, labor, maintenance savings. For example there is a real push for better refrigerators, which drives energy cost up, but the end user is only worried about safety.

None that I can think of.

Energy efficient equipment is more expensive to make, so it is harder to sell because the price is higher.

A lot of equipment is sold on the commodity market. That is it is sold on price. Energy efficiency generally increases the price so selling price is a barrier.

Manufacturers are bottom-line oriented. They don't easily make changes in production/ organizational practices/major returns on investment with short paybacks.

Category: End User

What does the manufacturer have to spend to get the energy savings feature. Once the decision is made, then they have the tooling costs

Cost them more money to produce, and they are in a very competitive market. Retooling costs. For the smaller manufacturers costs cannot be spread out over the product line or the units sold because they are small.

Category: Manufacturer

Whenever we develop energy efficient equipment the cost is higher. This is because the energy efficient equipment involves much more hardware. E.g. Griddle plates: standard griddle plate is a half inch steel plate with standard atmospheric burners. The energy efficient version has power burners. They take controls, motors. Thus they are more expensive. Any of all of the components can fail, resulting in reduced reliability. In this market there are two critical factors, one that it cooks the food well and second that it doesn't fail.

Category: Publication

Getting someone to pay for them. Refrigeration side has become hugely competitive. The low cost provider is winning. In a market that has such high capital needs market this is, the price will get squeezed.

Category: Trade Association

Just the cost to develop the equipment. Money that they don't feel they need to spend. If they are still interested in buying the Cadillac why make it more efficient. Pace of change is high. Customers are asking for it. Also because the chains are driving the industry. Chains are asking for branded equipment. That equipment is more energy efficient. The manufacturers will make it back because of volume.

It is not in their best interest to do research since they are already profitable. They expend as little as possible on R&D. The development of the standard testing methods will eventually force them to adjust. In addition, air quality standards, both indoor and outdoor; are also going to drive them to more efficient equipment. Finally, utility rates will continue to rise causing problems mostly for the small operators. The large operators can negotiate low rates with some other supplier while small end users cannot.

Q14 Do you think there are barriers for manufacturers reps in recommending cost effective food service equipment that are more energy efficient that typically found? If yes, what are they?

Category: Association

The rep has no good tools for estimating cost savings. Thus, it is difficult for reps to sell the customer on the concept. Need the ASTM and more work to use the information. Because each customer is unique, it is difficult to model the energy use of each customer in order to determine whether the equipment is cost-effective.

They are aware of the manufacturers' data. If they represented a manufacturer who produced highly efficient equipment, the reps probably wouldn’t sell it on that a basis. Or, they would use the manufacturers' data (if the data were favorable) to make product look good.

Category: Consultant

Apathy. They don't really care, they don't perceive energy efficiency as a way to sell more product.

Not that I can think of.

It is difficult to sell payback to the purchaser, who is not responsible for operating costs. This is a case of split incentives between construction and operating staff.

Energy efficiency is an incentive for the reps because they are on a commission. So the more the equipment costs (and energy efficient equipment does cost more) the better for them. This hasn't gotten out to the reps because the FSTC hasn't reached out to them.

Not well informed about the different types of customers/ organizational practices/ doesn't energy efficiency means and the ability to match efficiency to customer needs.

Category: End User

None. Will sell the features that the have. If it is price competitive then it is a leg up.

Far less driven by price. They are far more able to communicate value. Not really sure.

Category: Manufacturer

On the one hand they want to sell the more expensive equipment because they make more money on it, on the other hand they want to sell the simple equipment so they can compete and it gives fewer problems.

Category: Publication

Charged with selling a particular brand no matter what it's performance, so they will try to sell that. If they have an efficient model, and they think their customer will buy it, they try to sell it. If they don't have an efficient model, they try to steer the customer away from energy efficiency.

Category: Trade Association

More reluctant to recommend because the first cost is higher, means that it is harder for them to sell their equipment.

They will tell manufacturers when their equipment ceases to be competitive.

Q15 Do you think there are barriers for designers in recommending cost effective food service equipment that are more energy efficient that typically found? If yes, what are they?

Category: Association

For designers/specifiers, there is a lack of time to search out the relevant information. However, they should be able to justify the development of such information and a model since they do such a high volume.

The market is customer driven. That is, if customer wants it (I.e., performance data), then they’ll probably do it. Electric and gas compete. This creates a problem because the electric version is usually more efficient but gas version is cheaper to operate.

Category: Consultant

The designer looks at it differently (than the manufacturers reps. They are more interested in advanced performance. Technically more astute. If there is a barrier it is first cost. If performance enhance increases first cost. Need to talk [to customer] in [terms of] value verses cost. The end user is stuck in the mindset of first costs (Organizational practices). Manufacturers promote this by going to chains to sell at reduced costs. No one is educating the customer. (information and search costs)

Other factors regarding the equipment that make it less desirable for the users. Energy efficiency is so far down the criteria list that it doesn't come up.

It is difficult to sell payback to the purchaser, who is not responsible for operating costs. This is a case of split incentives between construction and operating staff.

First cost. They bid a job based on first cost basis. Also what I'll termed the "chefs preference" is a barrier. The chefs play a key roll in deciding on what equipment is purchased, and their main concern is product quality, not cost or efficiency.

They have little time. They are not accountable to customers. They are more concerned about aesthetics.

Category: End User

Yes, they are in bed with the manufactures. They are not really unbiased. They have to keep many manufactures on the line to be seen as unbiased. With only one manufactures line, they cannot credibly present options to clients. Once several manufacturers are offering equipment then the designer specifier can offer credible options.

They have a list of criteria that they have to meet, and energy efficiency comes later. They need to be educated. Designer specifier still focused on other issues.

Category: Manufacturer

On the one hand they want to sell the more expensive equipment because they make more money on it, on the other hand they want to sell the simple equipment so they can compete and it gives fewer problems. Their focus is more on controls so that a lower level of employee can produce more product. This means more sophisticated equipment.

Category: Publication

They can sell best quality for the money. Still the budget may overcome the specification in the final instance. They are still short of information that allows them to sell energy efficiency.

Category: Trade Association

Not as much. Some customers will look for lowest cost, but for them the amount of equipment drives fees.

First cost is a problem. Client demand that choice be price driven.

Q16

Category	Who of the following market actors have the greatest influence on the end user? Manufacturer, manufacturer rep, designer, other (specify)	Why?
Association		
	For the smaller customer, it is the manufacturer representatives. Larger customers are more influenced by the manufacturers. Doesn't know about designers.	
Consultant		
	Others number 1. (Manufacturer)	Largest segment of the market is still the independent restaurateur. Typical restaurant will buy from equipment salesmen (dealer). He will buy from usual supplier. These sources are usually highly under educated.
	Designer specifier (consultant and dealers). Next down is the manufacturer themselves	They have the greatest contact with the client.
	For the small user it is the designer or the retailer. For the fine restaurant it is the chef. For the larger chains it is the in-house specifier. The large chains are looking for consistency across their restaurants.	The small is just looking for the best priced product to do the job. The fine restaurant is simply looking for the best product. The chain has a whole list of criteria (see below)
	Depend on segment. Chains = manufacturers. Institutional/high end mom & pops = designers. Small deal with reps.	Chains simply buy on volume, they don't want to bother with reps, they go straight to the manufacturers. Additionally, most big chains get a lot of custom equipment, which they go directly to the manufacturer
	The sophisticated customers will take care of themselves. They will tell the manufacturers what they want. The designer/specifiers have the greatest influence on the less sophisticated end user.	
End User		
	Designer /specifier. Really it is the owner in our case. We work with designers but we specify everything. Not much really new. Look it up in the catalogs.	Limited equipment choices.
	Manufacturers rep, designer specifiers .	Manufacturers rep, mainly because they service the small users, designer specifiers because they service the chains.
Manufacturer		
	Dealers with showrooms have the most effect on the typical purchaser other than chains. Chains have a direct relationship between purchaser and manufacturer.	Dealers are in immediate contact with customer. They have the equipment on display for the user to see and get a feel for. The chains work with manufacturers to get exactly what they want at the best price.
Publication		
	Dealer. With everyone except noncommercial operators where consultants have the greatest energy efficiency effect	Most don't buy equipment very often. Very complex feature/brand mixture. Average operator can't compare all different brands for each type of equipment. Even chains use "consolidators". Top 200 restaurant companies control 55% of the sales and 37.5 % of the units in the restaurant segment. In the smaller users there is a lot of standard equipment.
Trade Association		
	Manufactures reps have a lot of influence. Designers have less influence	They go out and visit the customers and tell the customers what is going on. Their job is to know what is going on. The more knowledgeable that they appear the better the chance of the sales.
	It all depends on which segment you are talking and the size of the customer. Large new construction project will use a designer. Small operators will depend more on the seller of used equipment. The medium-sized customer will tend to depend more on the manufacturer's rep to verify what they plan to do	See 16 above.

Q17-Q19

Category	What are the criteria used by the large food service providers for making capital investments in food service equipment?	What are the criteria used by the medium food service providers for making capital investments in food service equipment?	What are the criteria used by the small food service providers for making capital investments in food service equipment?
Association			
	1. food quality 2. reliability 3. lifecycle costs (used to be first costs but are more sophisticated)	1. food quality 2. reliability 3. lifecycle costs (used to be first costs but are more sophisticated)	First costs. They find it difficult to get financing. Used equipment is worth less if restaurant go bust and bankers are very aware of the chances of a restaurant
	Payback is crucial. More so than for the small customer.	Cost is perhaps most important	Cost is perhaps most important
Consultant			
	Performance, first cost, energy efficiency.	First cost, performance, energy efficiency	First cost, first cost, first cost
	Overall ability to meet their usage demands, reliability, cost, serviceability, distribution of service centers	Overall ability to meet their usage demands, reliability, cost, serviceability, distribution of service centers	Overall ability to meet their usage demands, cost, reliability ,serviceability, availability of service agent.
	Quantity & quality, price, reliability, maintenance costs,	Quantity & quality, price, reliability, maintenance costs, but price more important	Price the most important
	First, suitability for particular food products (will it do job); second, relative performance (cooking); third, operating features; fourth, reliability; then energy efficiency	Same as for large food service providers, except as you move small food service providers the list truncates	Mostly first cost
	1. Specifications of the equipment (efficiency, production rates, durability, and food quality), 2) first cost, 3) maintenance cost.	1) First cost, 2) maintenance cost, 3) specifications of the equipment (efficiency, production rates, durability, and food quality).	1) First cost, 2) maintenance cost, 3) specifications of the equipment (efficiency, production rates, durability, and food
End User			
	Initial Price, maintenance cost over life, parts availability, energy consumption.	Price, less cash, his biggest investment is in the kitchen.	Price, he may even lease his equipment.
	Performance, cost, and how it fits in.	Performance, cost, and how it fits in.	Cost, and the ability to fit it in
Manufacturer			
	Cooking performance, reliability, cost over time, plus service on a world wide basis.	First cost, reliability, service	First cost
Publication			
	Capital cost, cooking performance criteria, reliability, use ergonomics/simplicity, maybe then energy efficiency.	Capital cost, cooking performance criteria, reliability, use ergonomics/simplicity, maybe then energy efficiency. The last matter less as the size goes down.	Capital cost, cooking performance criteria, reliability, use ergonomics/simplicity, maybe then energy efficiency. The last matter less as the size goes down.
Trade Association			
	Save them labor, cooks faster, more energy efficient, safety side, food code compliant, installation cost,	Save them labor, cooks faster, more energy efficient, safety side, food code compliant, installation cost, plus first cost	first cost and energy efficiency. They can't make up higher cost of energy in volume so their equipment has to be as efficient as possible.
	The large customers require a 3 year payback. Small operators are much less sophisticated and have little understanding of return on	The biggest issue is cash flow.	The biggest issue is cash flow.

Q20-Q21

Category	What are the various ways by which manufacturers are made aware of the existence and value of more energy efficient technologies?	What are the various ways by which manufacturer reps are made aware of the existence and value of more energy efficient
Association		
	Large manufacturers are better informed since they has national sales base. They are also informed through publications. Eventually more and more customers will demand more efficient technologies. Advisory groups (e.g., ASTM) also inform the larger manufacturers. The smaller manufacturers may not get the various publication. They may be informed simply by encountering the larger competitors in the marketplace and come to see the value of more efficient equipment	They could be informed by customers who demand test results. If equipment which they represent scores well, then manufacturers will tell them about it. In California, reps may be better informed since they have more opportunities to visit the FSTC.
	FSTC, published reports, seminars, EPRI, GRI, Edison Institute, and the AGA	Manufacturers and trade associations.
Consultant		
	Utilities in many parts of the country. Chain operator will go to manufacturers to get what they want, so many times they will make the manufacturers aware of more efficient technologies.	Solely from the manufacturers that they sell equipment for.
	Most have their own R&D. Their engineering group will raise flag. Don't know where they get it.	From manufacturer or competitive manufacturers reps. Other reps, mags, trade shows
	Catalogs, trade magazines, trade shows.	Catalogs, trade magazines, trade shows.
	Restaurant show, trade journals, sponsored research, invention and imitation	don't know.
	Publications; trade associations.	The manufacturers.
End User		
	Outside of FSTC none. They don't know. Don't know, don't look.	Other manufactures reps. They develop relationships. Salesmen talk
	Publications, Nations Restaurant News, trade association magazines	From their manufacturers
Manufacturer		
	Generally from the chains when they tell them that a competitor has developed something.	From their manufacturer.
Publication		
	Magazines, or from street sales if someone flogs energy efficiency.	If the manufacturer is selling energy efficient models, then the rep will find out from them. They are instructed what to try to sell. Magazines as a secondary source for reps.
Trade		
	Through some of the trade organizations, food service magazines, seminars (sponsored by NAFAM, NRA, FCSI)	Trade publications, industry seminars(sponsored by NAFAM, NRA, FCSI), organization for manufacturers reps and dealers.
	Utilities are doing a pretty decent job of telling manufacturers about the FSTC and that they have got to get much more efficient; End users are driven to wall by cost of energy. There are few things as operator that you have any control over - kWh cost are one of them; Not much inter-manufacturer influence but more in the future. That is, there will be more cases of the second- and third-tier chains emulating the first-tier chains just to stay competitive	Customers are demanding more information. This includes the second- and third-tier chains and largest of independent customers. The manufacturers reps often go to center with the customer

Q22-Q23

Category	What are the various ways by which designers/specifiers are made aware of the existence and value of more energy efficient technologies?	What are the various ways by which end users are made aware of the existence and value of more energy efficient technologies?
Association		
	Trade magazines. Large chains who may use their services will inform the designers and specifiers. Differences by state may not be that significant	Magazines, trade shows, FSTC. End users in California may be better informed than those out of state.
	Manufacturers and trade associations.	Trade associations, manufacturers for the larger end users. The smaller end users use equipment dealers.
Consultant		
	Look to manufacturers reps, will read the technical information, go to trade shows, magazines.	To a limited extent they read publications, also the people that they are buying from.
	Consultants: make the reps perform this function. Dealers: same way.	From the designer specifier and the reps.
	catalogs, trade magazines, trade shows.	catalogs, trade magazines, trade shows.
	FCSI group has a high quality annual meeting and very professional journal. Not open to the public.	Restaurant shows, utility sponsored meetings and seminars. Manufacturers directly inform chains. Asked why not journals: "These people don't sit around reading magazines."
	Manufacturers and professional organizations.	Manufacturers reps., trade shows, trade associations.
End User		
	Through their own professional societies. More professional.	Trade shows. MACO Networks, Publications.
	Trade publications and manufacturer reps.	Trade publications and manufacturer reps. End users will be skeptical about information that they only hear from sales people
Manufacturer		
	From the chains and the manufacturers reps.	When the stumble across it, they are usually the last to know, find out about it at trade shows.
Publication		
	Magazines and reps. Larger manufactures will court them.	Through dealers or magazines
Trade		
	Trade publications, industry seminars(sponsored by NAFAM, NRA, FCSI), organization for manufacturers reps and dealers	From the reps and trade publications more and more. A lot of the chains will have an equipment director. He will select equipment and he relies on the reps and the trade publications.
	Through the FSTC; through own professional societies, e.g., the Food Service Consultant Society. There is constant discussion in these societies regarding efficiency. Much of this discussion is occurring in the supermarket segment.	Second and third chains are informed via designers/specifiers; below that some are aware of efficiency but many are simply buried in the forest.

Q24 What are the reasons why an end user decides to purchase cooking equipment (READ: equipment failure, change in menu, improve quality, reduce energy use, new construction, new owner, increase throughput, other)

Category: Association

Missing

All of the above.

Category: Consultant

New construction (will be influenced by specifier), replacement of equipment (will usually be price driven, cheap wins).

New construction, renovation, menu change, growth, failure, can't get parts.

Didn't ask.

Those are the main ones, increasing sales, new operation methods. McDonalds is currently remodeling in 12,000 stores. 25 to 50 k per restaurant.

Planned replacement is rare. Large chains will change equipment when the menus change.

Category: End User

New construction, 7-10 year depreciation, planned replacements. Of all of the equipment in a building the kitchen equipment is the least maintained. Also new menu item requiring new equipment.

Because they need it, need for menu item.

Category: Manufacturer

Small restaurants will buy to replace existing or at startup. For chains the main reasons are expansion or menu changes.

Category: Publication

New construction (as much as half of the market), replacement/failure, menu change (especially in the chain world). Guess one in a thousand or less is for replaced for energy efficiency reasons.

Category: Trade Association

Change of menu, equipment failure, retrofit.

Almost everybody replaces on burnout.

Q25 What proportion of the food service equipment purchased in any given year is previously owned?

Category: Association

10 percent

Don’t know.

Category: Consultant

Varies from one part of the country to the other. Guess that it is less than twenty percent overall. Florida it is probably more like 70%.

Don't know. Don’t reuse equipment in general. Below 20% of what we do is renovation. 2-3% of new projects will want to purchase used equipment.

Didn't ask.

Don't know, ask Robin Ashton. Zero in Chains, 100% in corner hot dog stand.

Don't know.

Category: End User

Chains that are 20 stores or 20M in sales = 0%, and they represent about 60% of the whole restaurant industry, and is growing all the time. Mom and pop = 100%.

Chains = 5%, single units =60%

Category: Manufacturer

Don't know, believe a substantial amount.

Category: Publication

30% overall. The smaller the operator the more likely they are to have used equipment.

Category: Trade Association

Don't know. Guess 20%.

25 percent - most of the used equipment is purchased by the small and medium customers.

Q26

Category	Do you think that the local, regional, and even national demand for performance data on cooking technologies and ventilation will ever grow to the point that the FSTC could become financially self-supporting?	Why do you say that?
Association		
	yes	KFC is a good example. KFC may spend twenty million dollars on equipment. For an investment of this size, the equipment must be tested. Too important to pass up opportunity to test.
	Perhaps.	The FSTC can continue to charge fees. The FSTC has conducted surveys of energy use on certain equipment and has done some customized consulting for such customers as Safeway. Of course, it's possible that manufacturers will continue to request that their equipment be tested. However, there is still not enough incentive right now since there are no government mandates. Chains will certainly pay for it. UL might compete with the FSTC but only if there was enough business. Right now, there is not enough interest.
Consultant		
	Would sure hope so.	Tremendous value in it. Unfortunate that many utilities have not been able to maintain the effort over time. Consistency import in presenting the message to the market extremely important.
	No	Don't sense that in our society energy efficiency is going to get to a level that will get us to that point.
	Didn't ask.	-
	Yes, but I think that the FSTC must adopt a national posture for that to occur.	The FSTC must go to national outreach to get national exposure and national funding. Example: A major company's development was asking questions that were answered in the FSTC reports. They had none of the FSTC reports. They ought to have full set of reports. Got 25% off for the whole set. Not selling to the nation or the in this aggressive way.
	Perhaps.	The respondent seemed unable to specify why theFSTC might be able to become self-sustaining in the future.
End User		
	Finite # of methods to develop. If testing becomes a factor in the industry, yes. They would be able to walk in to me to present the results.	see above.
	Yes	It is a matter of time. The process is still maturing, the process of including energy efficiency and production information in the equipment selection. Will be precipitated by need for a common standard, need for accurate food safety info, rise in fuel cost. Is the industry currently on board? No, but 10 yr. ago the chains weren't even looking at it. Imitation of what the chains do will cause it to trickle down.
Manufacturer		
	Could be. Could almost be. I don't know what it costs to operate that place.	As more people find out about it they could demand data. We go there to get an independent evaluation of ours or someone else's equipment.
Publication		
	Don't know.	Think it is a matter of how well they can sell themselves to the chains. May have maxed out the manufacturers. Stronger market is doing performance data. Strong impetus on the part of the chains to want performance data because the return is greater when multiplied times the number of restaurants..
Trade Association		
	Depends on someone truly driving standards or labeling requirements. Without that no.	They wouldn't have the volume without someone driving the process.
	Don't think so even through the demand for services provided by the FSTC will be there.	This is because others, who will also be fuel neutral, will enter the marketplace and compete.

Other Comments

Category Association

Category Consultant

Probably covered it.

Energy Efficiency is not an issue in the market. Energy Efficiency is important in hoods, they are selling the fact that they have a product that is efficient, not that it saves energy. That is because it effect the HVAC load. Very few users know this.

What is the next major step? The end users have to see the advantage in requiring data. The Food Service Equipment report is an important step in getting users to take notice. This step could happen through the use of an "Energy Efficiency Rating Label", which could spark

General Comments: FSTC still has no one that comes from the food service industry. Need to have someone from the food service industry to make them think that way. Now minutes of meeting get out a few days before the meeting 6 months later. No newsletter. Lack of ongoing dialog with the manufactures and the chains. Invite the VPs of engineering from the manufactures at the beginning of a test development to get their input on test method design. Should focus on outreach much more!!!! Manufacturers need to be cultivated to a greater extent. Get chains involved for "pull through" to get the manufacturers to produce the products on a wider distribution basis.

One other nit. If you profile the list of reports, appliances that show up in development reports that don't have their own test reports (griddles). Process question: develop test reports, spoon feed through the ASTM, much later write development report. Should use draft development report in as the basis for the methods. Too much focus on getting it done rather than providing the information on the process. Refocus for greater manufacturers and chain involvement, and outreach at ASTM to get manufacturers involved in ASTM. Get manufacturers to participate in the process of test method revision process. Invite them to kickoff at the center as a start.

The FSTC has slowly moved away from production kitchen testing. This has been to the detriment of the program. This data carries a lot of influence and could be a very effective way of reaching the manufacturers.

Category End User

Until the FSTC came along there was no professionalism. Professionalism didn't exist prior to the FSTC. The industry now has a standard.

No. I have to get on to other things.

Category Manufacturer

I believe that the technology center needs to have food technologists available. The FSTC can test the equipment but they give no indication of the quality of the food cooked. If they had food technologists available they could give a full evaluation of the equipment in one place. Overall the customer is looking for a tool to cook with. Food quality it the number one issue. Don Fisher is a very valuable guy. He may be one of the most knowledge people in the industry concerning food service equipment.

Category Publication

There is a benefit to PG&E in doing the FSTC, they really are perceived as a premier facility for testing equipment. Helps them in their home markets. It could help them on the national market if they get into the national market.

Category Trade Association

Trends are a big influence on the industry. Regulation. This industry is quickly becoming a lot more regulated. As an organization Food Safety Council deals a lot with regulations. Affects a lot of the dynamics of the industry. E.g. minimum wage laws are a major influencer. Food Safety could precipitate an energy efficiency standard. On the front burner right now. The industry is growing fast. There is a definite need for the FSTC.

Appendix C
Final Participant Telephone Survey and Responses

Good (morning/afternoon). My name is ____________________. I am calling on behalf of Pacific Gas and Electric Company. We are conducting a survey about the impacts of the PG&E Food Service Technology Center. According to our records, you have had interactions with the FSTC. Is that correct?.

No ⇨ Our records may be in error. Thank you for your time. (Terminate call)

Yes ⇩

PG&E is trying to determine how the FSTC may have influenced how people make decisions about energy efficiency in the food service area. The results of the study are to be reported to the California Public Utilities Commission. We would like to ask you some questions related to how you think about energy efficiency. The survey will take approximately 20 minutes. Your responses will be kept confidential.

May I proceed?

1. Do you influence what equipment is purchased for new or existing sites?

   ❑ Yes ❑ No Thank and End

2. What is your title?

   ❑ Owner/Partner ❑ Chef ❑ Manager

   ❑ President ❑ Other: ___________________

Response	Frequency of Response	
	N	%
Owner/Partner	2	5.6
Chef	3	8.3
Manager	8	22.2
President	0	0.0
Other	23	63.9
Total	36	100

3. What are your primary responsibilities?

4. Is your company considered a sit down or fast food restaurant?

- ❑ Sit Down
- ❑ Fast Food
- ❑ Other (Specify ______________________)
- ❑ DK

Response	Frequency of Response	
	N	%
Sit Down	14	38.9
Fast Food	9	25.
Other	8	22.2
Don't Know	5	13.9
Total	36	100

5. About how many other sites does your company have in California?

Response	Response Frequency	
	N	%
0	11	30.6
2	2	5.6
4	1	2.8
5	1	2.8
7	1	2.8
10	1	2.8
15	5	13.9
17	1	2.8
19	1	2.8
20	1	2.8
23	1	2.8
30	1	2.8
37	1	2.8
40	1	2.8
41	1	2.8
65	1	2.8
111	1	2.8
150	1	2.8
300	1	2.8
500	1	2.8
800	1	2.8
Total	36	100.

6. About how many full-time foodservice employees are there at <u>this</u> site? ______________

Response	Response Frequency	
	N	%
0	6	16.7
1	1	2.8
2	1	2.8
3	1	2.8
5	3	8.3
8	1	2.8
10	2	5.6
11	1	2.8
12	1	2.8
25	4	11.1
30	1	2.8
35	1	2.8
37	1	2.8
40	1	2.8
45	7	19.4
50	1	2.8
75	1	2.8
200	1	2.8
250	1	2.8
Total	36	100.

7. Compared to other sites like yours, would you consider yourself to be small, medium or large in terms of revenue?

❑ small ❑ medium ❑ large

Response	Frequency of Response	
	N	%
Small	5	13.9
Medium	13	36.1
Large	18	50.0
Total	36	100

8. Thinking about all the foodservice operating costs you have, in what areas do you see your greatest opportunities to reduce these costs? **(Do not read list; prompt if needed) (Multiple answers allowed)**

❑ labor ❑ food ❑ electricity and gas

❑ rent ❑ equipment purchases

❑ Other (specify)

Response	Frequency of Response	
	N	%
Labor	13	23.2
Food	13	23.2
Gas and Electricity	11	19.6
Rent	1	1.8
Equipment Purchases	15	26.8
Other	3	5.4
Total	56	100

9. Now, I'd like to ask you some questions regarding the importance of energy efficiency and conservation to your company. On a scale of 1 to 10, with 1 being extremely unimportant and 10 being extremely important, how important is each of the following: **(Randomized a-e)**

a. Improving energy efficiency to reduce operating costs. ___

b. Improving energy efficiency to protect the environment. ___

c. Your energy concerns compared to other business concerns. ___

d. Recycling more to reduce costs. ___

e. Recycling more to protect the environment. ___

Response	Frequency of Response 9a		Frequency of Response 9b		Frequency of Response 9c		Frequency of Response 9d		Frequency of Response 9e	
	N	%	N	%	N	%	N	%	N	%
1	0	0.0	1	2.8	0	0.0	1	2.8	0	0.0
2	0	0.0	0	0.0	0	0.0	1	2.8	1	2.8
3	0	0.0	1	2.8	2	5.6	1	2.8	2	5.6
4	0	0.0	1	2.8	5	13.9	1	2.8	3	8.3
5	5	13.9	2	5.6	6	16.7	7	19.4	3	8.3
6	3	8.3	1	2.8	3	8.3	5	13.9	4	11.1
7	6	16.7	7	19.4	5	13.9	7	19.4	3	8.3
8	8	22.2	16	44.4	11	30.6	6	16.7	11	30.6
9	6	16.7	6	16.7	2	5.6	4	11.1	4	11.1
10	8	22.2	1	2.8	1	2.8	3	8.3	5	13.9
Don't Know	0	0.0	0	0.0	1	2.8	0	0.0	0	0.0
Total	36	100	36	100	36	100	36	100	36	100

10. I am now going to refer to the Food Service Technology Center as just the Center for the rest of the interview. What type of information did you learn about during your visit to the Center last year? **(Read list) (Multiple answers allowed)**

- ❑ Cooking equipment efficiency
- ❑ Ventilation equipment efficiency
- ❑ Refrigeration equipment efficiency
- ❑ Other

Response	Frequency of Response	
	N	%
Cooking	29	37.7
Ventilation	25	32.5
Refrigeration	21	27.3
Other	2	2.6
Total	77	100

11. Prior to your participation at the Center, had you received any formal education or training on this topic (these topics)? **(Randomized 11-13)**

- ❑ Yes
- ❑ No
- ❑ DK

Response	Frequency of Response	
	N	%
Yes	22	61.1
No	14	38.9
Don't Know	0	0.0
Total	36	100

12. Prior to attending the Center had you actively sought information, publications, or views of colleagues on this topic (these topics)?
    - ❑ Yes
    - ❑ No
    - ❑ DK

Response	Frequency of Response	
	N	%
Yes	29	80.6
No	7	19.4
Don’t Know	0	0.0
Total	36	100

13. Prior to participating in this activity at the Center, had you actually used the concepts, skills, and technologies discussed at the Center activity?
    - ❑ Yes
    - ❑ No
    - ❑ DK

Response	Frequency of Response	
	N	%
Yes	20	55.6
No	16	44.4
Don’t Know	0	0.0
Total	36	100

Now, I would like you to think about the period since you attended the Center.

14. Have you sought more information on this topic (these topics) or received more services from the Center?
    - ❑ Yes
    - ❑ No
    - ❑ DK

Response	Frequency of Response	
	N	%
Yes	26	72.2
No	10	27.8
Don’t Know	0	0.0
Total	36	100

15. Have you sought more information about this topic (these topics) in trade publications, journals, or from colleagues.
    - ❑ Yes
    - ❑ No
    - ❑ DK

Response	Frequency of Response	
	N	%
Yes	29	80.6
No	7	19.4
Don’t Know	0	0.0
Total	36	100

16. Have you visited or talked with personnel at sites where the concepts and technologies related to this area (these areas) have been implemented?

- ❑ Yes
- ❑ No
- ❑ DK

Response	Frequency of Response	
	N	%
Yes	21	58.3
No	15	41.7
Don’t Know	0	0.0
Total	36	100

17. Have you sought more information on this topic (these topics) from manufacturers or distributors?

- ❑ Yes
- ❑ No
- ❑ DK

Response	Frequency of Response	
	N	%
Yes	32	88.9
No	0	0.0
Don’t Know	4	11.1
Total	36	100

18. Have you *actually used* some of the concepts and technologies you learned about at the Center?

❑ Yes **(GO TO 20)**

❑ No

❑ DK

Response	Frequency of Response	
	N	%
Yes	31	86.1
No	5	13.9
Don’t Know	0	0.0
Total	36	100

19. Do you plan to use some of the concepts and technologies you learned about at the Center?

❑ Yes

❑ No

❑ DK

Response	Frequency of Response	
	N	%
Yes	29	100.
No	0	0.0
Don’t Know	0	0.0
Total	29	100

I’m going to take a minute to explain to you about the next set of questions. We are particularly interested in understanding how decisions are made regarding purchasing of required energy-using equipment such as griddles, hoods, and refrigerators. I am going to read a list of statements which may or may not apply to your experience when considering the purchase of this type of equipment. Please indicate, on a scale of 1 to 10, whether you agree or disagree. A 1 means you strongly disagree and a 10 means you strongly agree. When I mention “energy efficient equipment”, I mean equipment that has the same use but uses less energy than another similar piece of equipment. **(Randomized 20-28)**

20. Our practice is not to worry about equipment unless it breaks down.

Response	Response Frequency	
	N	%
1	15	41.7
2	7	19.4
3	2	5.6
4	2	5.6
5	5	13.9
6	2	5.6
7	2	5.6
8	1	2.8
9	0	0.0
10	0	0.0
Don’t Know	0	0.0
Total	36	100

21. When we select equipment, the most important consideration is immediate delivery.

Response	Response Frequency	
	N	%
1	5	13.9
2	5	13.9
3	5	13.9
4	6	16.7
5	7	19.4
6	3	8.3
7	3	8.3
8	1	2.8
9	0	0.0
10	1	2.8
Don’t Know	0	0.0
Total	36	100

22. Our company includes the long run operating and maintenance costs of equipment in its initial calculations.

Response	Response Frequency	
	N	%
1	0	0.0
2	1	2.8
3	2	5.6
4	2	5.6
5	4	11.1
6	4	11.1
7	5	13.9
8	9	25.
9	2	5.6
10	7	19.4
Don't Know	0	0.0
Total	36	100.

23. When we select our equipment, the most important issue is its initial cost.

Response	Response Frequency	
	N	%
1	2	5.6
2	0	0.0
3	6	16.7
4	4	11.1
5	6	16.7
6	7	19.4
7	5	13.9
8	4	11.1
9	0	0.0
10	2	5.6
Don't Know	0	0.0
Total	36	100.

24. The most important operational issue for our company is keeping our foodservice costs under control.

Response	Response Frequency	
	N	%
1	0	0.0
2	0	0.0
3	0	0.0
4	2	5.6
5	4	11.1
6	2	5.6
7	4	11.1
8	8	22.2
9	3	8.3
10	13	36.1
Don't Know	0	0.0
Total	36	100

25. Investing extra money in energy efficient equipment would reduce our ability to take advantage of other investment opportunities.

Response	Response Frequency	
	N	%
1	12	33.3
2	6	16.7
3	6	16.7
4	3	8.3
5	2	5.6
6	1	2.8
7	2	5.6
8	1	2.8
9	2	5.6
10	0	0.0
Don't Know	1	2.8
Total	36	100.

26. I don't see any reason to be proactive with regard to energy efficiency in today's economy.

Response	Response Frequency	
	N	%
1	21	41.7
2	5	19.4
3	5	5.6
4	4	5.6
5		13.9
6		5.6
7		5.6
8		2.8
9		0.0
10		0.0
Don't Know		0.0
Total	36	100

[FIX THIS]

27. The operational costs savings from installing energy efficient equipment would not flow into my departments budget.

Response	Response Frequency	
	N	%
1	12	33.3
2	5	13.9
3	4	11.1
4	0	0.0
5	3	8.3
6	0	0.0
7	0	0.0
8	4	11.1
9	3	8.3
10	3	8.3
Don't Know	2	5.6
Total	36	99.9

28. The people who have to make the investments in energy efficient equipment for our company are not the same ones who would see the benefits in lower operating costs.

Response	Response Frequency	
	N	%
1	14	38.9
2	3	8.3
3	5	13.9
4	1	2.8
5	1	2.8
6	3	8.3
7	2	5.6
8	4	11.1
9	0	0.0
10	2	5.6
Don’t Know	1	2.8
Total	36	100.

Because we feel that your interactions between dealers for different types of equipment may vary, we also want to ask you questions about cooking, refrigeration, and ventilation or hood equipment. Please rate the following statements with a 1 to 10 scale like we just used with a 1 meaning you strongly disagree and a 10 meaning you strongly agree. **(Randomize 29-37 and within each question)**

29. When we select cooking equipment, the most important thing we look for is reliability of operation.

________| DK/NA 29a

What number would you give for refrigeration equipment?

_______________| DK/NA 29b

For Hoods?

_______________| DK/NA 29c

Response	Frequency of Response Cooking		Frequency of Response Refrigeration		Frequency of Response Ventilation	
	N	%	N	%	N	%
1	0	0.0	0	0.0	0	0.0
2	1	2.8	1	2.8	1	2.8
3	0	0.0	0	0.0	0	0.0
4	2	5.6	1	2.8	1	2.8
5	2	5.6	4	11.1	6	16.7
6	2	5.6	2	5.6	2	5.6
7	4	11.1	1	2.8	3	8.3
8	10	27.8	13	36.1	9	25.
9	5	13.9	7	19.4	5	13.9
10	10	27.8	7	19.4	9	25.
Don't Know	0	0.0	0	0.0	0	0.0
Total	36	100.2	36	100	36	100.1

30. The return on investment from energy efficient cooking equipment is difficult to estimate.

_______________| DK/NA 30a

What number would you give for refrigeration equipment?

_______________| DK/NA 30b

For Hoods?

_______________| DK/NA 30c

Response	Frequency of Response Cooking		Frequency of Response Refrigeration		Frequency of Response Ventilation	
	N	%	N	%	N	%
1	6	16.7	6	16.7	5	13.9
2	3	8.3	5	13.9	2	5.6
3	3	8.3	3	8.3	5	13.9
4	1	2.8	0	0.0	1	2.8
5	6	16.7	8	22.2	5	13.9
6	4	11.1	5	13.9	2	5.6
7	3	8.3	1	2.8	2	5.6
8	7	19.4	6	16.7	8	22.2
9	1	2.8	0	0.0	2	5.6
10	1	2.8	1	2.8	3	8.3
Don’t Know	1	2.8	1	2.8	1	2.8
Total	36	100	36	100.1	36	100.2

31. Our company is unwilling to take the risks involved in the use of high efficiency cooking equipment.

_______________| DK/NA 31a

What number would you give for refrigeration equipment?

_______________| DK/NA 31b

For Hoods?

_______________| DK/NA 31c

Response	Frequency of Response Cooking		Frequency of Response Refrigeration		Frequency of Response Ventilation	
	N	%	N	%	N	%
1	11	30.6	10	27.8	11	30.6
2	10	27.8	9	25.	8	22.2
3	6	16.7	9	25.	8	22.2
4	4	11.1	1	2.8	2	5.6
5	0	0.0	2	5.6	3	8.3
6	1	2.8	2	5.6	1	2.8
7	1	2.8	1	2.8	2	5.6
8	2	5.6	1	2.8	1	2.8
9	1	2.8	1	2.8	0	0.0
10	0	0.0	0	0.0	0	0.0
Don't Know	0	0.0	0	0.0	0	0.0
Total	36	100.2	36	100.2	36	100.1

32. Our company has the expertise to evaluate the performance of our cooking equipment.

    ________________| DK/NA 32a

    What number would you give for refrigeration equipment?

    ________________| DK/NA 32b

    For Hoods?

    ________________| DK/NA 32c

Response	Frequency of Response Cooking		Frequency of Response Refrigeration		Frequency of Response Ventilation	
	N	%	N	%	N	%
1	0	2.0	0	0.0	3	2.0
2	3	1.0	3	1.0	4	1.0
3	3	0.0	3	0.0	3	0.0
4	5	1.0	4	2.0	3	1.0
5	5	4.0	5	0.0	6	2.0
6	1	2.0	0	2.0	2	3.0
7	1	4.0	3	6.0	2	5.0
8	11	17.0	9	17.0	5	12.0
9	3	13.0	4	9.0	3	12.0
10	4	53.0	5	63.0	5	57.0
Don't Know	0	3.0	0	0.0	0	5.0
Total	100	100	100	100	100	100

33. It's hard to figure out which cooking equipment to buy because of all the technical information you have to find.

_______________| DK/NA 33a

What number would you give for refrigeration equipment?

_______________| DK/NA 33b

For Hoods?

_______________| DK/NA 33c

Response	Frequency of Response Cooking		Frequency of Response Refrigeration		Frequency of Response Ventilation	
	N	%	N	%	N	%
1	3	8.3	3	8.3	3	8.3
2	3	8.3	3	8.3	1	2.8
3	3	8.3	2	5.6	3	8.3
4	4	11.1	5	13.9	2	5.6
5	8	22.2	7	19.4	6	16.7
6	2	5.6	4	11.1	3	8.3
7	6	16.7	4	11.1	5	13.9
8	4	11.1	4	11.1	7	19.4
9	1	2.8	1	2.8	1	2.8
10	2	5.6	3	8.3	4	11.1
Don't Know	0	0.0	0	0.0	1	2.8
Total	36	100	36	99.9	36	100

34. It's hard to get a handle on the benefits of energy efficient cooking equipment without a detailed written analysis.

_______________| DK/NA 34a

What number would you give for refrigeration equipment?

_______________| DK/NA 34b

For Hoods?

_______________| DK/NA 34c

Response	Frequency of Response Cooking		Frequency of Response Refrigeration		Frequency of Response Ventilation	
	N	%	N	%	N	%
1	1	2.8	1	2.8	1	2.8
2	1	2.8	1	2.8	1	2.8
3	2	5.6	2	5.6	1	2.8
4	2	5.6	3	8.3	1	2.8
5	2	5.6	1	2.8	3	8.3
6	1	2.8	1	2.8	2	5.6
7	6	16.7	9	25.	8	22.2
8	9	25.	9	25.	6	16.7
9	8	22.2	5	13.9	9	25.
10	4	11.1	4	11.1	4	11.1
Don't Know	0	0.0	0	0.0	0	0.0
Total	36	100.2	36	100.1	36	100.1

35. Cooking equipment sales people usually just try to push the products of whatever manufacturer they're closest to.

_______________| DK/NA 35a

What number would you give for refrigeration equipment?

_______________| DK/NA 35b

What would your rating be for Hoods?

_______________| DK/NA 35c

Response	Frequency of Response Cooking		Frequency of Response Refrigeration		Frequency of Response Ventilation	
	N	%	N	%	N	%
1	2	5.6	2	5.6	3	8.3
2	0	0.0	0	0.0	1	2.8
3	2	5.6	2	5.6	2	5.6
4	4	11.1	3	8.3	2	5.6
5	3	8.3	7	19.4	4	11.1
6	7	19.4	4	11.1	5	13.9
7	4	11.1	5	13.9	6	16.7
8	5	13.9	4	11.1	3	8.3
9	4	11.1	4	11.1	4	11.1
10	4	11.1	4	11.1	4	11.1
Don't Know	1	2.8	1	2.8	2	5.6
Total	36	100	36	100	36	100.1

36. Cooking equipment dealers and representatives use the desire for high-efficiency equipment by customers like us to charge more than it's really worth.

_______________| DK/NA 36a

What number would you give for refrigeration equipment?

_______________| DK/NA 36b

For Hoods?

_______________| DK/NA 36c

Response	Frequency of Response Cooking		Frequency of Response Refrigeration		Frequency of Response Ventilation	
	N	%	N	%	N	%
1	2	5.6	1	2.8	1	2.8
2	1	2.8	1	2.8	1	2.8
3	0	0.0	0	0.0	0	0.0
4	5	13.9	5	13.9	3	8.3
5	12	33.3	15	41.7	13	36.1
6	1	2.8	2	5.6	3	8.3
7	7	19.4	6	16.7	5	13.9
8	2	5.6	3	8.3	4	11.1
9	2	5.6	0	0.0	0	0.0
10	1	2.8	0	0.0	2	5.6
Don't Know	3	8.3	3	8.3	4	11.1
Total	36	100.1	36	100.1	36	100

37. I think much of what salesmen for cooking equipment tell us about the performance of high efficiency cooking equipment is exaggerated.

    ________________| DK/NA 37a

    What number would you give for refrigeration equipment?

    ________________| DK/NA 37b

    For Hoods?

    ________________| DK/NA 37c

Response	Frequency of Response Cooking		Frequency of Response Refrigeration		Frequency of Response Ventilation	
	N	%	N	%	N	%
1	0	0.0	1	2.8	0	0.0
2	1	2.8	2	5.6	0	0.0
3	3	8.3	3	8.3	2	5.6
4	5	13.9	4	11.1	3	8.3
5	10	27.8	10	27.8	13	36.1
6	4	11.1	2	5.6	3	8.3
7	5	13.9	6	16.7	6	16.7
8	4	11.1	4	11.1	3	8.3
9	0	0.0	0	0.0	1	2.8
10	2	5.6	2	5.6	2	5.6
Don't Know	2	5.6	2	5.6	3	8.3
Total	36	100.1	36	100.2	36	100

Now I have a few general questions.

38. Have you ever heard of the American Society for Testing and Materials, often referred to as the ASTM?

    ❑ Yes

    ❑ No **(GO TO 40)**

    ❑ DK **(GO TO 40)**

Response	Frequency of Response	
	N	%
Yes	24	66.7
No	12	33.3
Don't Know	0	0.0
Total	36	100

39. Where did you hear about the ASTM? (Do not read; prompt if needed) **(Accept multiple answers)**

❑ Manufacturer ❑ Publication ❑ Trade Show

❑ Other End User ❑ Utility ❑ Dealer

❑ FSTC ❑ Other: ___________________

Response	Frequency of Response	
	N	%
Manufacturer	3	9.
Publication	13	41.
Trade Show	1	3.
Other End User	1	3.
Utility	2	6.
Dealer	3	9.
FSTC	2	6.
Other	7	22.
Total	**32**	**99**

40. There are standard test methods, adopted by the ASTM, which provide accurate, reproducible results providing production efficiency and energy efficiency for different pieces of cooking equipment (i.e., griddles, ovens, fryers). How aware are you of those methods? **(Read)**

❑ Not at all aware **(GO TO 43)**

❑ Somewhat aware

❑ Very aware

❑ DK **(GO TO 43)**

Response	Frequency of Response	
	N	%
Not at all aware	8	22.2
Somewhat aware	13	26.1
Very aware	14	38.9
Don’t Know	1	2.8
Total	36	100

41. How did you hear of these testing methods? (Do not read; prompt if needed) **(Accept multiple answers)**

- ❑ Manufacturer ❑ Publication ❑ Trade Show
- ❑ Other End User ❑ Utility ❑ Dealer
- ❑ FSTC ❑ Other: ___________________

Response	Frequency of Response	
	N	%
Manufacturer	4	11.
Publication	8	22.
Trade Show	3	8.
Other End User	1	3.
Utility	4	11.
Dealer	2	6.
FSTC	8	22.
Other	6	17.
Total	**36**	**100**

42. Have you ever asked your dealer or manufacturer representative about how specific pieces of equipment scored on *these tests* before purchasing them?

- ❑ Yes
- ❑ No
- ❑ DK

Response	Frequency of Response	
	N	%
Yes	12	44.4
No	15	55.6
Don’t Know	0	0.0
Total	27	100

43. In the last few years, how often have you asked your dealer, manufacturer, their sales representative, or designer about cooking equipment which saves energy?

Response	Response Frequency	
	N	%
0	10	27.8
1	1	2.8
2	4	11.1
3	2	5.6
4	2	5.6
5	4	11.1
10	5	13.9
12	2	5.6
20	1	2.8
24	1	2.8
30	1	2.8
50	1	2.8
100	1	2.8
Don't Know	1	2.8
Total	36	100.3

44. How about refrigeration equipment which saves energy?

_________ ❑ DK

Response	Response Frequency	
	N	%
0	10	27.8
1	1	2.8
2	6	16.7
3	3	8.3
4	1	2.8
5	5	13.9
6	1	2.8
7	1	2.8
8	1	2.8
10	3	8.3
12	1	2.8
20	1	2.8
50	2	5.6
Total	36	100.2

45. How about ventilation equipment which saves energy?

_________ ❑ DK

Response	Response Frequency	
	N	%
0	12	33.3
2	6	16.7
3	3	8.3
4	4	11.1
5	3	8.3
10	4	11.1
12	1	2.8
33	1	2.8
50	1	2.8
Don't Know	1	2.8
Total	36	100

46. If you had to replace some of the cooking equipment at your restaurant right now, which of the following best describes the efficiency level of the unit that you would purchase: **(Read)**

❑ Standard Efficiency

❑ Above average efficiency

❑ Very high efficiency

❑ DK

Response	Frequency of Response	
	N	%
Standard Efficiency	2	5.6
Above Average Efficiency	17	47.2
Very High Efficiency	17	47.2
Don't Know	0	0
Total	36	100

47. How about if you had to replace some of the refrigeration equipment, **(Read)**

- ❑ Standard Efficiency
- ❑ Above average efficiency
- ❑ Very high efficiency
- ❑ DK

Response	Frequency of Response	
	N	%
Standard Efficiency	2	5.6
Above Average Efficiency	13	36.1
Very High Efficiency	21	58.3
Don't Know	0	0
Total	36	100

48. How about if you had to replace some of the ventilation equipment, **(Read)**

- ❑ Standard Efficiency
- ❑ Above average efficiency
- ❑ Very high efficiency
- ❑ DK

Response	Frequency of Response	
	N	%
Standard Efficiency	3	8.3
Above Average Efficiency	14	38.9
Very High Efficiency	19	52.8
Don't Know	0	0
Total	36	100

49. Have you ever heard of the magazine, *Foodservice Equipment reports*?

- ❑ Yes
- ❑ No **(GO TO 51)**
- ❑ DK **(GO TO 51)**

Response	Frequency of Response	
	N	%
Yes	23	63.9
No	13	36.1
Don't Know	0	0.0
Total	36	100

50. Do you currently receive the *Foodservice Equipment reports*?

- ❑ Yes
- ❑ No
- ❑ DK

Response	Frequency of Response	
	N	%
Yes	15	65.2
No	8	34.8
Don’t Know	0	0.0
Total	23	100

51. I am going to read a list of factors that can influence decisions about designs and technology in food service construction and renovation projects. On a scale of “1” to “10”, where “1” is not at all important and “10” is very important, please tell me how important each of the following was in shaping a decision or making a recommendation for your most recent projects. **(Randomized 51-54)**

Information from professional workshops ______________|DK

Response	Response Frequency	
	N	%
1	2	5.6
2	0	0.0
3	2	5.6
4	1	2.8
5	3	8.3
6	6	16.7
7	5	13.9
8	7	19.4
9	3	8.3
10	7	19.4
Don’t Know	0	0.0
Total	36	100

52. A demonstration or test that your company may have conducted _____________|DK

Response	Response Frequency	
	N	%
1	2	5.6
2	0	0.0
3	0	0.0
4	0	0.0
5	3	8.3
6	1	2.8
7	5	13.9
8	14	38.9
9	5	13.9
10	6	16.7
Don't Know	0	0.0
Total	36	100.

53. Utility rebates _______________|DK

Response	Response Frequency	
	N	%
1	1	2.8
2	0	0.0
3	1	2.8
4	2	5.6
5	6	16.7
6	5	13.9
7	5	13.9
8	6	16.7
9	1	2.8
10	7	19.4
Don't Know	2	5.6
Total	36	100.

54. Technical information from utility representative _________|DK

Response	Response Frequency	
	N	%
1	0	0.0
2	0	0.0
3	2	5.6
4	0	0.0
5	1	2.8
6	4	11.1
7	6	16.7
8	14	38.9
9	3	8.3
10	5	13.9
Don’t Know	1	2.8
Total	36	100.

55. Within the last few years, how many times has your dealer, manufacturer, their sales representative, or designer recommended cooking equipment which saves energy?

_________ ❑ DK

Response	Response Frequency	
	N	%
0	8	22.2
1	1	2.8
2	8	22.2
3	2	5.6
4	2	5.6
5	5	13.9
6	2	5.6
8	2	5.6
9	2	5.6
12	1	2.8
20	1	2.8
25	1	2.8
Don’t Know	1	2.8
Total	36	100.3

56. How often have they recommended ventilation equipment which saves energy?

Response	Response Frequency	
	N	%
0	16	44.4
1	4	11.1
2	5	13.9
3	3	8.3
4	1	2.8
5	3	8.3
6	2	5.6
12	2	5.6
Total	36	100

57. How often have they recommended refrigeration equipment which saves energy?

Response	Response Frequency	
	N	%
0	11	30.6
1	3	8.3
2	3	8.3
3	4	11.1
4	2	5.6
5	4	11.1
6	6	16.7
10	2	5.6
Don't Know	1	2.8
Total	36	100.1

Finally, I'd like to ask you some questions that will help us understand how information get passed among professionals. For each item, please tell me how many times within the last few years, you have done the action described. **(Randomized 58-63)**

58. Passed on material obtained at the Center to others.

Response	Response Frequency	
	N	%
0	6	16.7
1	2	5.6
2	6	16.7
3	3	8.3
5	9	25.
6	1	2.8
8	1	2.8
10	2	5.6
15	1	2.8
20	1	2.8
24	1	2.8
36	1	2.8
50	1	2.8
300	1	2.8
Total	36	100.3

59. Used technical data from the Center to support a decision.

Response	Response Frequency	
	N	%
0	10	27.8
1	4	11.1
2	4	11.1
3	5	13.9
4	3	8.3
5	5	13.9
6	1	2.8
7	1	2.8
8	1	2.8
50	1	2.8
200	1	2.8
Total	36	100.1

60. Demonstrated or explained to a colleague the benefits of energy efficiency.

Response	Response Frequency	
	N	%
0	6	16.7
2	5	13.9
3	4	11.1
5	5	13.9
10	4	11.1
12	3	8.3
15	1	2.8
20	1	2.8
24	2	5.6
25	1	2.8
30	2	5.6
100	1	2.8
Don’t Know	1	2.8
Total	36	100.2

61. Promoted or implemented changes to internal policies or practices in response to information from colleagues about energy efficiency.

Response	Response Frequency	
	N	%
0	1	2.8
1	6	16.7
2	6	16.7
3	5	13.9
4	2	5.6
5	4	11.1
6	4	11.1
10	1	2.8
12	1	2.8
20	3	8.3
24	2	5.6
Don’t Know	1	2.8
Total	36	100.2

62. Suggested or insisted that a partner or contractor incorporate ideas learned at the Center.

Response	Response Frequency	
	N	%
0	12	33.3
1	1	2.8
2	8	22.2
3	2	5.6
4	3	8.3
5	4	11.1
6	2	5.6
8	2	5.6
30	1	2.8
100	1	2.8
Total	36	100.1

63. Discussed ideas presented at the Center with a manufacturer or manufacturer's representative to encourage product change.

Response	Response Frequency	
	N	%
0	9	25.
1	3	8.3
2	3	8.3
3	4	11.1
4	2	5.6
5	2	5.6
6	2	5.6
9	1	2.8
10	4	11.1
12	2	5.6
16	1	2.8
24	1	2.8
30	1	2.8
50	1	2.8
Total	36	100.2

That completes this survey. On behalf of PG&E, I thank you for your time.

Final FSTC Participant Call Disposition
4/21/99

	PARTICIPANTS
Total Dialings	650
Answering machine	227
Callbacks	177
Left message	74
No answer	62
Disconnects	8
Refusals	7
Other	8
Completes	36
Terminates	51

Wrong #	7
Never available	4
No longer w/company	3
Didn’t attend	31
Not decision maker	2
Attended in ‘97	1
Vague re subject	2
Dup #	1

Appendix D
Final End Users Telephone Survey and Responses

Good (morning/afternoon). My name is ____________________. I am calling on behalf of Pacific Gas and Electric Company. We are conducting a survey about how the food service sector looks at energy efficiency. The results of the study are to be reported to the California Public Utilities Commission. The survey will take approximately 20 minutes. Your responses will be kept confidential.

May I proceed?

1. Are you the person who either decides or has a say in what equipment is purchased for new and existing sites?

   ❑ Yes ❑ No (Try and get number of person who does and contact them)

Response	Frequency of Response	
	N	%
Yes	100	100

2. What is your title?

   ❑ Owner/Partner ❑ Chef ❑ Manager

   ❑ President ❑ Other: ___________________

Response	Frequency of Response	
	N	%
Owner/Partner	52	52.0
Chef	1	4.0
Manager	38	1.0
President	4	38.0
Other	5	5.0
Total	100	100

3. What are your primary responsibilities? ____________________________________

4. About how many other sites does your company have in California?

Response	Frequency of Response	
	N	%
None	38	38.0
1	29	29.0
2-49	24	24.0
50-199	5	5.0
200-600	4	4.0
Total	100	100

5. About how many full-time employees are there at this site? _________________

Response	Frequency of Response	
	N	%
None	3	3.0
2-10	62	62.0
11-50	31	31.0
51-126	3	3.0
1000	1	1.0
Total	100	100

6. Compared to other sites like yours, would you consider yourself to be small, medium or large in terms of revenue?

❑ Small ❑ Medium ❑ Large

Response	Frequency of Response	
	N	%
Small	47	47.0
Medium	44	44.0
Large	9	9.0
Total	100	100

7. Thinking about all the foodservice operating costs you have, in what areas do you see your greatest opportunities to reduce these costs? **(Do not read list; prompt if needed) (Multiple answers allowed)**

   ❑ labor ❑ food ❑ gas and electricity

   ❑ rent ❑ equipment purchases

   ❑ Other (specify) ______________________________

Response	Frequency of Response	
	N	%
Labor	29	24.8
Food	29	24.8
Gas and Electricity	29	24.8
Rent	6	5.1
Equipment Purchases	5	4.3
Other	5	4.3
None	14	12.
Total	117	100

8. Now, Id like to ask you some questions regarding the importance of energy efficiency and conservation to your company. On a scale of 1 to 10, with 1 being extremely unimportant and 10 being extremely important, how important is each of the following: **(Randomize a-e)**

   a. Improving energy efficiency to reduce operating costs. ___|DK

   b. Improving energy efficiency to protect the environment. ___|DK

   c. Your energy concerns compared to other business concerns. ___|DK

   d. Recycling more to reduce costs. ___|DK

   e. Recycling more to protect the environment. ___|DK

Response	Frequency of Response 8a		Frequency of Response 8b		Frequency of Response 8c		Frequency of Response 8d		Frequency of Response 8e	
	N	%	N	%	N	%	N	%	N	%
1	0	0.0	2	2.0	1	1.0	6	6.0	2	2.0
2	1	1.0	2	2.0	6	6.0	3	3.0	5	5.0
3	1	1.0	3	3.0	5	5.0	3	3.0	4	4.0
4	2	2.0	1	1.0	4	4.0	5	5.0	1	1.0
5	5	5.0	9	9.0	17	17.0	8	8.0	8	8.0
6	3	3.0	5	5.0	7	7.0	7	7.0	7	7.0
7	8	8.0	11	11.0	11	11.0	9	9.0	9	9.0
8	19	19.0	14	14.0	19	19.0	14	14.0	17	17.0
9	7	7.0	12	12.0	7	7.0	8	8.0	8	8.0
10	54	54.0	40	40.0	19	19.0	37	37.0	39	39.0
Don’t Know	0	0.0	1	1.0	4	4.0	0	0.0	0	0.0
Total	100	100	100	100	100	100	100	100	100	100

I’m going to take a minute to explain to you about the next set of question. We are particularly interested in understanding how decisions are made regarding purchasing of required energy-using equipment such as griddles, hoods, and refrigerators. I am going to read a list of statements which may or may not apply to your experience when considering the purchase of this type of equipment. Please indicate, on a scale of 1 to 10, whether you agree or disagree. A 1 means you strongly disagree and a 10 means you strongly agree. When I mention “energy efficient equipment”, I mean equipment that has the same use but uses less energy than another similar piece of equipment.

(Randomize 9-17)

9. Our practice is not to worry about equipment unless it breaks down.

| DK/NA

Response	Response Frequency	
	N	%
1	35	35.0
2	7	7.0
3	8	8.0
4	4	4.0
5	5	5.0
6	3	3.0
7	6	6.0
8	11	11.0
9	3	3.0
10	16	16.0
Don't Know	2	2.0
Total	100	100

10. When we select equipment, the most important consideration is immediate delivery.

| DK/NA

Response	Response Frequency	
	N	%
1	12	12.0
2	3	3.0
3	6	6.0
4	4	4.0
5	17	17.0
6	6	6.0
7	6	6.0
8	7	7.0
9	7	7.0
10	32	32.0
Don't Know	0	0.0
Total	100	100

11. Our company includes the long run operating and maintenance costs of equipment in its initial calculations.

______________| DK/NA

Response	Response Frequency	
	N	%
1	6	6.0
2	1	1.0
3	2	2.0
4	1	1.0
5	11	11.0
6	8	8.0
7	13	13.0
8	16	16.0
9	4	4.0
10	34	34.0
Don't Know	4	4.0
Total	100	100

12. When we select our equipment, the most important issue it its initial cost.

______________| DK/NA

Response	Response Frequency	
	N	%
1	8	8.0
2	6	6.0
3	2	2.0
4	5	5.0
5	11	11.0
6	5	5.0
7	15	15.0
8	12	12.0
9	5	5.0
10	31	31.0
Don't Know	0	0.0
Total	100	100

13. The most important operational issue for our company is keeping our foodservice costs under control.

______________| DK/NA

Response	Response Frequency	
	N	%
1	2	2.0
2	0	0.0
3	0	0.0
4	0	0.0
5	5	5.0
6	3	3.0
7	4	4.0
8	12	12.0
9	9	9.0
10	64	64.0
Don't Know	1	1.0
Total	100	100

14. Investing extra money in energy efficient equipment would reduce our ability to take advantage of other investment opportunities.

______________| DK/NA

Response	Response Frequency	
	N	%
1	17	17.0
2	6	6.0
3	6	6.0
4	2	2.0
5	16	16.0
6	5	5.0
7	6	6.0
8	11	11.0
9	5	5.0
10	26	26.0
Don't Know	0	0.0
Total	100	100

15. I don't see any reason to be proactive with regard to energy efficiency in today's economy.

______________| DK/NA

Response	Response Frequency	
	N	%
1	42	42.0
2	6	6.0
3	6	6.0
4	2	2.0
5	6	6.0
6	6	6.0
7	5	5.0
8	10	10.0
9	4	4.0
10	10	10.0
Don't Know	3	3.0
Total	100	100

16. The operational costs savings from installing energy efficient equipment would not flow into my departments budget.

______________| DK/NA

Response	Response Frequency	
	N	%
1	29	29.0
2	6	6.0
3	9	9.0
4	3	3.0
5	17	17.0
6	5	5.0
7	6	6.0
8	5	5.0
9	2	2.0
10	15	15.0
Don't Know	3	3.0
Total	100	100

17. The people who have to make the investments in energy efficient equipment for our company are not the same ones who would see the benefits in lower operating costs.

______________| DK/NA

Response	Response Frequency	
	N	%
1	42	42.0
2	2	2.0
3	4	4.0
4	1	1.0
5	8	8.0
6	0	0.0
7	6	6.0
8	14	14.0
9	4	4.0
10	12	12.0
Don't Know	7	7.0
Total	100	100

Because we feel that your interactions between dealers for different types of equipment may vary, we also want to ask you questions about cooking, refrigeration, and ventilation or hood equipment. Please rate the following statements with a 1 to 10 scale like we just used with a 1 meaning you strongly disagree and a 10 meaning you strongly agree.

(Randomize 18 – 26)

18. When we select cooking equipment, the most important thing we look for is reliability of operation.

    ______________| DK/NA 18a

    What number would you give for refrigeration equipment?

    ______________| DK/NA 18b

    For hoods?

    ______________| DK/NA 18c

Response	Frequency of Response Cooking		Frequency of Response Refrigeration		Frequency of Response Ventilation	
	N	%	N	%	N	%
1	2	2.0	0	0.0	2	2.0
2	1	1.0	1	1.0	1	1.0
3	0	0.0	0	0.0	0	0.0
4	1	1.0	2	2.0	1	1.0
5	4	4.0	0	0.0	2	2.0
6	2	2.0	2	2.0	3	3.0
7	4	4.0	6	6.0	5	5.0
8	17	17.0	17	17.0	12	12.0
9	13	13.0	9	9.0	12	12.0
10	53	53.0	63	63.0	57	57.0
Don't Know	3	3.0	0	0.0	5	5.0
Total	100	100	100	100	100	100

19. The return on investment from energy efficient cooking equipment is difficult to estimate.

______________| DK/NA 19a

What number would you give for refrigeration equipment?

______________| DK/NA 19b

For hoods?

______________| DK/NA 19c

Response	Frequency of Response Cooking		Frequency of Response Refrigeration		Frequency of Response Ventilation	
	N	%	N	%	N	%
1	6	6.0	3	3.0	5	5.0
2	5	5.0	6	6.0	5	5.0
3	3	3.0	4	4.0	2	2.0
4	2	2.0	3	3.0	2	2.0
5	12	12.0	12	12.0	10	10.0
6	3	3.0	2	2.0	2	2.0
7	4	4.0	9	9.0	8	8.0
8	18	18.0	17	17.0	11	11.0
9	6	6.0	5	5.0	9	9.0
10	36	36.0	36	36.0	39	39.0
Don’t Know	5	5.0	3	3.0	7	7.0
Total	100	100	100	100	100	100

20. Our company is unwilling to take the risks involved in the use of high efficiency cooking equipment.

_____________| DK/NA 20a

What number would you give for refrigeration equipment?

_____________| DK/NA 20b

For hoods?

_____________| DK/NA 20c

Response	Frequency of Response Cooking		Frequency of Response Refrigeration		Frequency of Response Ventilation	
	N	%	N	%	N	%
1	25	25.0	26	26.0	28	28.0
2	9	9.0	8	8.0	7	7.0
3	6	6.0	8	8.0	6	6.0
4	6	6.0	6	6.0	4	4.0
5	13	13.0	14	14.0	14	14.0
6	2	2.0	4	4.0	0	0.0
7	5	5.0	8	8.0	8	8.0
8	10	10.0	7	7.0	8	8.0
9	3	3.0	4	4.0	4	4.0
10	12	12.0	10	10.0	10	10.0
Don’t Know	9	9.0	5	5.0	11	11.0
Total	100	100	100	100	100	100

21. Our company has the expertise to evaluation the performance of our cooking equipment.

_____________| DK/NA 21a

What number would you give for refrigeration equipment?

_____________| DK/NA 21b

For hoods?

_____________| DK/NA 21c

Response	Frequency of Response Cooking		Frequency of Response Refrigeration		Frequency of Response Ventilation	
	N	%	N	%	N	%
1	10	10.0	10	10.0	13	13.0
2	3	3.0	3	3.0	5	5.0
3	5	5.0	6	6.0	4	4.0
4	3	3.0	3	3.0	3	3.0
5	12	12.0	13	13.0	13	13.0
6	4	4.0	5	5.0	8	8.0
7	5	5.0	7	7.0	6	6.0
8	13	13.0	15	15.0	7	7.0
9	5	5.0	5	5.0	4	4.0
10	36	36.0	31	31.0	33	33.0
Don’t Know	4	4.0	2	2.0	4	4.0
Total	100	100	100	100	100	100

22. It's hard to figure out which cooking equipment to buy because of all the technical information you have to find.

_____________| DK/NA 22a

What number would you give for refrigeration equipment?

_____________| DK/NA 22b

For hoods?

_____________| DK/NA 22c

Response	Frequency of Response Cooking		Frequency of Response Refrigeration		Frequency of Response Ventilation	
	N	%	N	%	N	%
1	21	21.0	19	19.0	15	15.0
2	14	14.0	15	15.0	12	12.0
3	3	3.0	2	2.0	3	3.0
4	2	2.0	5	5.0	3	3.0
5	12	12.0	13	13.0	15	15.0
6	4	4.0	4	4.0	2	2.0
7	4	4.0	5	5.0	6	6.0
8	9	9.0	10	10.0	9	9.0
9	6	6.0	4	4.0	6	6.0
10	21	21.0	22	22.0	23	23.0
Don't Know	4	4.0	1	1.0	6	6.0
Total	100	100	100	100	100	100

23. It's hard to get a handle on the benefits of energy efficient cooking equipment without a detailed written analysis.

_____________| DK/NA 23a

What number would you give for refrigeration equipment?

_____________| DK/NA 23b

For hoods?

_____________| DK/NA 23c

Response	Frequency of Response Cooking		Frequency of Response Refrigeration		Frequency of Response Ventilation	
	N	%	N	%	N	%
1	11	11.0	9	9.0	10	10.0
2	2	2.0	3	3.0	3	3.0
3	3	3.0	7	7.0	5	5.0
4	4	4.0	3	3.0	2	2.0
5	7	7.0	5	5.0	6	6.0
6	6	6.0	8	8.0	7	7.0
7	8	8.0	9	9.0	7	7.0
8	13	13.0	15	15.0	14	14.0
9	7	7.0	5	5.0	7	7.0
10	34	34.0	34	34.0	31	31.0
Don't Know	5	5.0	2	2.0	8	8.0
Total	100	100	100	100	100	100

24. Cooking equipment sales people usually just try to push the products of whatever manufacturer they're closest to.

_____________| DK/NA 24a

What number would you give for refrigeration equipment?

_____________| DK/NA 24b

For hoods?

_____________| DK/NA 24c

Response	Frequency of Response Cooking		Frequency of Response Refrigeration		Frequency of Response Ventilation	
	N	%	N	%	N	%
1	12	12.0	10	10.0	10	10.0
2	0	0.0	2	2.0	2	2.0
3	7	7.0	6	6.0	5	5.0
4	1	1.0	1	1.0	0	0.0
5	10	10.0	15	15.0	11	11.0
6	9	9.0	3	3.0	5	5.0
7	8	8.0	6	6.0	8	8.0
8	10	10.0	14	14.0	13	13.0
9	3	3.0	4	4.0	2	2.0
10	34	34.0	35	35.0	32	32.0
Don't Know	6	6.0	4	4.0	12	12.0
Total	100	100	100	100	100	100

25. Cooking equipment dealers and representatives use the desire for high-efficiency equipment by customers like us to charge more than it's really worth.

_____________| DK/NA 25a

What number would you give for refrigeration equipment?

_____________| DK/NA 25b

For hoods?

_____________| DK/NA 25c

Response	Frequency of Response Cooking		Frequency of Response Refrigeration		Frequency of Response Ventilation	
	N	%	N	%	N	%
1	8	8.0	8	8.0	9	9.0
2	6	6.0	4	4.0	5	5.0
3	6	6.0	4	4.0	7	7.0
4	3	3.0	2	2.0	1	1.0
5	14	14.0	21	21.0	17	17.0
6	6	6.0	6	6.0	6	6.0
7	9	9.0	8	8.0	9	9.0
8	7	7.0	9	9.0	7	7.0
9	6	6.0	3	3.0	2	2.0
10	26	26.0	26	26.0	24	24.0
Don't Know	9	9.0	9	9.0	13	13.0
Total	100	100	100	100	100	100

26. I think much of what salesmen for cooking equipment tell us about the performance of high efficiency cooking equipment is exaggerated.

    _____________| DK/NA 26a

    What number would you give for refrigeration equipment?

    _____________| DK/NA 26b

    For hoods?

    _____________| DK/NA 26c

Response	Frequency of Response Cooking		Frequency of Response Refrigeration		Frequency of Response Ventilation	
	N	%	N	%	N	%
1	10	10.0	11	11.0	9	9.0
2	3	3.0	4	4.0	3	3.0
3	3	3.0	4	4.0	3	3.0
4	2	2.0	2	2.0	1	1.0
5	20	20.0	21	21.0	24	24.0
6	11	11.0	9	9.0	7	7.0
7	13	13.0	14	14.0	12	12.0
8	9	9.0	10	10.0	8	8.0
9	3	3.0	3	3.0	3	3.0
10	13	13.0	12	12.0	14	14.0
Don't Know	13	13.0	10	10.0	16	16.0
Total	100	100	100	100	100	100

Now I have a few general questions.

27. Have you ever heard of the American Society for Testing and Materials, often referred to as the ASTM?

    ❑ Yes

    ❑ No **(GO TO 29)**

    ❑ DK **(GO TO 29)**

Response	Frequency of Response	
	N	%
Yes	20	20.0
No	78	78.0
Don't Know	2	2.0
Total	100	100

28. Where did you hear about the ASTM? **(Accept multiple answers)**

- ❑ Manufacturer ❑ Publication ❑ Trade Show
- ❑ Other End User ❑ Utility ❑ Dealer
- ❑ FSTC ❑ Other: ___________________

Response	Frequency of Response	
	N	%
Manufacturer	0	0.0
Publication	12	60.0
Trade Show	0	0.0
Other End User	0	0.0
Utility	2	10.0
Dealer	0	0.0
FSTC	0	0.0
Other	6	30.0
Total	**20**	**100**

29. There are standard test methods, adopted by the ASTM, which provide accurate, reproducible results providing production efficiency and energy efficiency for different pieces of cooking equipment (i.e., griddles, ovens, fryers). How aware are you of those methods? **(Read)**

- ❑ Not at all aware **(GO TO 32)**
- ❑ Somewhat aware
- ❑ Very aware
- ❑ DK **(GO TO 32)**

Response	Frequency of Response	
	N	%
Not at all aware	61	61.0
Somewhat aware	35	35.0
Very aware	2	2.0
Don't Know	2	2.0
Total	100	100

30. How did you hear of these testing methods? (Do not read; prompt if needed) **(Accept multiple answers)**

❑ Manufacturer ❑ Publication ❑ Trade Show

❑ Other End User ❑ Utility ❑ Dealer

❑ FSTC ❑ Other: ___________________

Response	Frequency of Response	
	N	%
Manufacturer	1	2.7
Publication	11	29.73
Trade Show	0	0.0
Other End User	0	0.0
Utility	4	10.81
Dealer	6	16.22
FSTC	0	0.0
Other	15	40.54
Total	**37**	**100**

31. Have you ever asked your dealer or manufacturer representative about how specific pieces of equipment scored on *these tests* before purchasing them?

❑ Yes

❑ No

❑ DK

Response	Frequency of Response	
	N	%
Yes	12	32.43
No	25	67.57
Total	37	100

32. Within the past few years, how many times have you asked your dealer, manufacturer, their sales representative, or designer about cooking equipment which saves energy?

Response	Response Frequency	
	N	%
0	58	58.0
1	7	7.0
2	13	13.0
3	5	5.0
4	4	4.0
5	4	4.0
6	2	2.0
7	1	1.0
10	3	3.0
15	1	1.0
Don't Know	2	2.0
Total	100	100

33. How about refrigeration equipment which saves energy?

Response	Response Frequency	
	N	%
0	48	48.0
1	12	12.0
2	16	16.0
3	5	5.0
4	1	1.0
5	10	10.0
8	1	1.0
10	1	1.0
15	3	3.0
40	1	1.0
Don't Know	2	2.0
Total	100	100

34. How about ventilation equipment which saves energy?

Response	Response Frequency	
	N	%
0	65	65.0
1	9	9.0
2	8	8.0
3	5	5.0
4	3	3.0
5	6	6.0
6	1	1.0
11	1	1.0
Don't Know	2	2.0
Total	100	100

35. Have you ever heard of the Food Services Technology Center (the Center)?

- ❑ Yes
- ❑ No **(GO TO 43)**
- ❑ DK **(GO TO 43)**

Response	Frequency of Response	
	N	%
Yes	16	16.0
No	79	79.0
Don't Know	5	5.0
Total	100	100

36.

Where did you hear about it? (Do not read; prompt if needed) (Accept multiple answers)

- ❑ Manufacturer ❑ Publication ❑ Trade Show
- ❑ Other End User ❑ Utility ❑ Dealer
- ❑ Other: ___________________

Response	Frequency of Response	
	N	%
Manufacturer	0	0.0
Publication	6	37.5
Trade Show	2	12.5
Other End User	0	0.0
Utility	2	12.5
Dealer	2	12.5
Other	4	25.0
Total	**16**	**100**

37. Have you ever been contacted by the Center regarding energy efficient equipment?

- ❑ Yes (If yes, how many times over the last three years?____) 36a
- ❑ No **(GO TO 39)**
- ❑ DK **(GO TO 39)**

Response	Frequency of Response	
	N	%
Yes	0	0.0
No	16	100.0
Total	16	100

38. What was the reason the Center contacted you?

No answers to this question

39. Have you ever contacted the Center regarding the performance of equipment?

- ❑ Yes (If yes, how many times over the last three years?____) 38a
- ❑ No (GO TO 41)
- ❑ DK (GO TO 41)

Response	Frequency of Response	
	N	%
Yes	2	12.5
No	14	87.5
Total	16	100

40. What was the reason you contacted the Center? ______________________________

```
Wanted to buy a pizza oven.
Regarding energy efficiency of equipment.
```

41. Do you know anyone in the restaurant business who has ever attended an activity at the Center?

- ❑ Yes
- ❑ No (GO TO 43)
- ❑ DK (GO TO 43)

Response	Frequency of Response	
	N	%
Yes	0	0.0
No	16	100.0
Total	16	100

42. What was their overall impression of what they learned at the Center?

No answers to this question

43. If you had to replace some of the cooking equipment at your restaurant right now, which of the following best describes the efficiency level of the unit that you would purchase: **(Read)**

- ❑ Standard Efficiency
- ❑ Above average efficiency
- ❑ Very high efficiency
- ❑ DK

Response	Frequency of Response	
	N	%
Standard efficiency	23	23.0
Above average efficiency	35	35.0
Very high efficiency	38	38.0
Don’t Know	4	4.0
Total	100	100

44. How about if you had to replace some of the refrigeration equipment? **(Read)**

- ❑ Standard Efficiency
- ❑ Above average efficiency
- ❑ Very high efficiency
- ❑ DK

Response	Frequency of Response	
	N	%
Standard efficiency	27	27.0
Above average efficiency	30	30.0
Very high efficiency	41	41.0
Don’t Know	2	2.0
Total	100	100

45. How about if you had to replace some of the ventilation equipment? **(Read)**

- ❑ Standard Efficiency
- ❑ Above average efficiency
- ❑ Very high efficiency
- ❑ DK

Response	Frequency of Response	
	N	%
Standard efficiency	34	34.0
Above average efficiency	27	27.0
Very high efficiency	35	35.0
Don't Know	4	4.0
Total	100	100

46. Have you ever heard of the magazine, *Foodservice Equipment Reports*?

- ❑ Yes
- ❑ No (GO TO 48)
- ❑ DK (GO TO 48)

Response	Frequency of Response	
	N	%
Yes	20	20.0
No	76	76.0
Don't Know	4	4.0
Total	100	100

47. Do you currently receive the *Foodservice Equipment Reports*?

- ❑ Yes
- ❑ No
- ❑ DK

Response	Frequency of Response	
	N	%
Yes	10	50.0
No	10	50.0
Don't Know	0	0
Total	20	100

48. I am going to read a list of four factors that can influence decisions about designs and technology in food service construction and renovation projects. On a scale of "1" to "10", where "1" is not at all important and "10" is very important, please tell me how important each of the following was in shaping a decision or making a recommendation for your most recent projects. Information from professional workshops

____

Response	Response Frequency	
	N	%
1	15	15.0
2	5	5.0
3	5	5.0
4	1	1.0
5	24	24.0
6	2	2.0
7	5	5.0
8	13	13.0
9	4	4.0
10	19	19.0
Don't Know	7	7.0
Total	100	100

49. A demonstration or test that your company may have conducted _____________

Response	Response Frequency	
	N	%
1	15	15.0
2	5	5.0
3	2	2.0
4	0	0.0
5	14	14.0
6	9	9.0
7	8	8.0
8	11	11.0
9	8	8.0
10	23	23.0
Don’t Know	5	5.0
Total	100	100

50. Utility rebates _______________

Response	Response Frequency	
	N	%
1	8	8.0
2	3	3.0
3	6	6.0
4	2	2.0
5	15	15.0
6	7	7.0
7	9	9.0
8	12	12.0
9	3	3.0
10	29	29.0
Don’t Know	6	6.0
Total	100	100

51. Technical information from utility representative _________

Response	Response Frequency	
	N	%
1	6	6.0
2	4	4.0
3	3	3.0
4	2	2.0
5	18	18.0
6	4	4.0
7	12	12.0
8	12	12.0
9	6	6.0
10	27	27.0
Don’t Know	6	6.0
Total	100	100

52. In the past few years, how often has your dealer, manufacturer, their sales representative, or designer recommended cooking equipment which saves energy?

Response	Response Frequency	
	N	%
0	52	52.0
1	8	8.0
2	12	12.0
3	6	6.0
4	5	5.0
5	5	5.0
7	1	1.0
8	1	1.0
9	2	2.0
10	1	1.0
20	1	1.0
Don’t Know	6	6.0
Total	100	100

53. How about ventilation equipment which saves energy?

Response	Response Frequency	
	N	%
0	60	60.0
1	9	9.0
2	6	6.0
3	2	2.0
4	4	4.0
5	6	6.0
7	2	2.0
8	2	2.0
9	1	1.0
Don’t Know	8	8.0
Total	100	100

54. How about refrigeration equipment which saves energy?

Response	Response Frequency	
	N	%
0	44	44.0
1	14	14.0
2	10	10.0
3	4	4.0
4	4	4.0
5	9	9.0
6	4	4.0
7	1	1.0
8	1	1.0
9	1	1.0
10	1	1.0
20	1	1.0
Don’t Know	6	6.0
Total	100	100

Finally, I’d like to ask you two questions that will help us understand how information get passed among professionals. For each item, please tell me how many times within the last few years you have done the action described.

55. Demonstrated or explained to a colleague the benefits of energy efficiency.

Response	Response Frequency	
	N	%
0	49	49.0
1	6	6.0
2	9	9.0
3	4	4.0
4	2	2.0
5	8	8.0
6	2	2.0
8	1	1.0
9	2	2.0
10	6	6.0
12	2	2.0
15	2	2.0
20	1	1.0
24	1	1.0
50	2	2.0
Don't Know	3	3.0
Total	100	100

56. Promoted or implemented changes to internal policies or practices in response to information from colleagues about energy efficiency.

Response	Response Frequency	
	N	%
0	37	37.0
1	13	13.0
2	10	10.0
3	4	4.0
4	5	5.0
5	6	6.0
6	8	8.0
7	1	1.0
8	1	1.0
10	7	7.0
12	1	1.0
25	2	2.0
50	2	2.0
Don't Know	3	3.0
Total	100	100

That completes this survey. On behalf of PG&E, I thank you for your time.

Final FSTC Nonparticipant Call Disposition

4/8/99

	NONPARTICIPANTS
Total Dialings	4296
Answering machine	292
Callbacks	2115
No answer	892
Disconnects	231
Refusals	200
Language barrier	127
Other	80
Completes	100
Terminates	259
Q1	32
Wrong #	227
# names used	997
# names not used	503

Appendix E
Final Designer Interview and Responses

Company Name Phone #:

Contact Name Time Start

Good (morning/afternoon). My name is ____________________. I am calling on behalf of Pacific Gas and Electric Company. We are conducting a survey about how the food service sector looks at energy efficiency. The results of the study are to be reported to the California Public Utilities Commission. The survey will take approximately 15 to 20 minutes. Your responses will be kept confidential.

May I proceed?

1. Does your company design kitchens for the food service market?

❑ Yes ❑ No (Thank and Terminate)

Response	Frequency of Response	
	N	%
Yes	11	100
No	0	0

A good portion of the interview questions request quantifiable responses, however I would like you to feel free to expand on you answers as you see appropriate. What we are trying to understand is how the market for energy efficient kitchen equipment works, or doesn't work.

2. What is your title?

❑ Sales Rep. ❑ Engineer ❑ Manager

❑ President ❑ Other:

Response	Frequency of Response	
	N	%
Sales Rep	0	0.0
Engineer	0	0.0
Manager	0	0.0
President	4	36.36
Other	7	63.64
Total	11	100

Other Responses:

Q2A
Partner
Principle
VP
Principle
Chairman of the Board
Principle
CEO, Chairman

3. What are your primary responsibilities?

Q3
not highly structured - do what needs to be done
whatever needs to be done
Everything - one man business
The works, from acquiring the customer though construction administration
Do design work and do outline specs and ME and EE rough-ins
facility planning
food service facility design
Own the business, do marketing, chief designer
all areas
Run the company, consulting and design and training
Design the food facilities

4. What are your company's areas of expertise?

Q4
Primarily target institutional (schools, hospitals, corrections) and industrial (private food processing and distribution)
Institutional mainly - prisons, country clubs, resorts
layout kitchen facilities and equipment selection
Everything except prisons and large hospitals. Business, industry, schools, long term health care
Facility planning, schematic layout, programming the space, engineering aspect of it, size ventilation systems – now doing more of the specifications of the cfms
All types of businesses – facility planning
wide variety, schools, prisons, restaurants, fast foods
Food service consulting, planning, design. Mostly institutional: military, or corporate.
Public assembly market, management and design.
Independent caterers, vending companies, industrial business locations
Hotel casinos, restaurants, correctional facilities, schools, ski resorts

5. Compared to other companies like yours, would you consider yourself to be small, medium or large in terms of revenue?

❑ Small ❑ Medium ❑ Large

Response	Frequency of Response	
	N	%
Small	5	45.45
Medium	4	36.36
Large	2	18.18
Total	11	99.99

6. Would you please describe the types of customers that you typically work with?

Q6
Primarily target institutional (schools, hospitals, corrections) and industrial (private food processing and distribution)
in conjunction with an architectural firm
institutions (schools and correctional mainly)
Business, industry, schools, long term health care
Institutional - hospital, prison, convention centers, hotels, some restaurants, schools
architects
Varied – national chains, local chains, individual entrepreneurs, public work
Electronics companies, federal government, correctional institutions, military, schools. No restaurants.
Bulk of our business are sports franchises, management companies, operators of stadiums, arenas convention centers.
Independent caterers, vending companies, industrial business locations, hospitals
80-90 % architect, supply houses, directly with owner

7. When working on a kitchen design, what are the types of companies you work with?

Q7
Analyze the project and use different companies – spectrum of manufacturers that they use – use associate consultants that they sometime work with
architectural, engineering firms, some manufacturers
work for architects most of the time (they are his clients) - coordinate with engineers of all types (mechanical, electrical, structural)
Typically we work for an architect. On a rare occasion we will hire a management advisory specialist as a sub. Usually the architect hires the engineers, etc.
Architect, end user has a lot to do with it, some with ME and EE – they make the decisions or have clients tell them what to do
owners as well as architects
architects or direct with the customer
Usually a sub to the architect (70% of the time), 30% of the time for the owner directly.
Typically we work for an architect, with mechanical engineer, plumbing, code compliance, operator.
Working independently, all jobs are negotiated, rarely work for anyone other than the owner. Do all the specification ourselves.
The architect’s entourage, engineers, etc.

We are particularly interested in understanding how decisions are made regarding the design of required energy-using equipment such as griddles, hoods, and refrigerators. I am going to read a list of statements that may or may not apply to your experience when you are designing this type of equipment. Please indicate, on a scale of 1 to 10, whether you agree or disagree. A 1 means you strongly disagree and a 10 means you strongly agree. When I mention “energy efficient equipment”, I mean equipment that has the same use but uses less energy than another similar piece of equipment.

8. Our customers never request information on energy efficiency.

Response	Frequency of Response	
	N	%
1	0	0.0
2	0	0.0
3	0	0.0
4	2	18.18
5	5	45.45
6	1	9.09
7	0	0.0
8	1	9.09
9	1	9.09
10	1	9.09
Don't Know	0	0.0
Total	11	99.99

9. Our customers look at only the first cost in the design of a kitchen.

Response	Frequency of Response	
	N	%
1	1	9.09
2	1	9.09
3	0	0.0
4	1	9.09
5	2	18.18
6	0	0.0
7	1	9.09
8	1	9.09
9	3	27.27
10	1	9.09
Don't Know	0	0.0
Total	11	99.99

10. When we select equipment, the most important consideration is immediate delivery.

Response	Frequency of Response	
	N	%
1	3	27.27
2	6	54.55
3	0	0.0
4	1	9.09
5	1	9.09
6	0	0.0
7	0	0.0
8	0	0.0
9	0	0.0
10	0	0.0
Don’t Know	0	0.0
Total	11	100

11. Our company includes information on the long run operating and maintenance costs of equipment in its initial design estimates.

Response	Frequency of Response	
	N	%
1	5	45.45
2	2	18.18
3	0	0.0
4	2	18.18
5	0	0.0
6	0	0.0
7	2	18.18
8	0	0.0
9	0	0.0
10	0	0.0
Don’t Know	0	0.0
Total	11	99.99

12. When we select equipment, the most important issue it its initial cost.

Response	Frequency of Response	
	N	%
1	4	36.36
2	2	18.18
3	1	9.09
4	1	9.09
5	1	9.09
6	1	9.09
7	0	0.0
8	0	0.0
9	0	0.0
10	1	9.09
Don't Know	0	0.0
Total	11	99.99

13. Investing extra money in energy efficient equipment would reduce our client's ability to take advantage of other investment opportunities.

Response	Frequency of Response	
	N	%
1	1	9.09
2	2	18.18
3	1	9.09
4	1	9.09
5	2	18.18
6	0	0.0
7	0	0.0
8	2	18.18
9	0	0.0
10	1	9.09
Don't Know	1	9.09
Total	11	99.99

14. I don't see any reason to be proactive about energy efficiency in today's economy.

Response	Frequency of Response	
	N	%
1	4	36.36
2	1	9.09
3	2	18.18
4	0	0.0
5	1	9.09
6	1	9.09
7	0	0.0
8	2	18.18
9	0	0.0
10	0	0.0
Don't Know	0	0.0
Total	11	99.99

15. What types of the kitchen equipment do you specify for your customers?

Q15
Broad range – can opener to a full manufacturing system – full commercial or industrial kitchen or system
Everything - full service kitchen
Storage equipment, preparation equipment, kitchen, exhaust, dishwashing, serving, major equipment (not small wares)
The full kitchen, all types of equipment, from the back door to the flue exit. Specification grade, best bang for buck. We never recommend short cycle hoods. They don't work
All types for a full kitchen
Everything in a kitchen (not the dishware/ pots and pans)
All types for commercial foodservice preparation, ventilation, dishwashing
All types
All
Electric, everything for the kitchen. Specialize in equipment that will handle packaging and labeling. Much of the food is prepared for later service. All prep area equipment including conveyors.
The whole thing

Because we feel that your interactions with dealers may vary for different types of equipment, we also want to ask you questions about cooking, refrigeration, and ventilation (or hood) equipment. Please rank the following statements on a 1 to 10 scale like we just used with a 1 meaning you strongly disagree and a 10 meaning you strongly agree.

16. Our company has the expertise to select energy efficient cooking equipment.

    What number would you give for refrigeration equipment?

    For hoods?

Response	Frequency of Response Cooking		Frequency of Response Refrigeration		Frequency of Response Ventilation	
	N	%	N	%	N	%
1	0	0.0	0	0.0	0	0.0
2	0	0.0	0	0.0	0	0.0
3	1	9.09	0	0.0	0	0.0
4	0	0.0	0	0.0	0	0.0
5	0	0.0	0	0.0	0	0.0
6	0	0.0	0	0.0	0	0.0
7	1	9.09	4	36.36	1	9.09
8	1	9.09	1	9.09	2	18.18
9	2	18.18	0	0.0	2	18.18
10	6	54.55	6	54.55	6	54.55
Don’t Know	0	0.0	0	0.0	0	0.0
Total	11	100	11	100	11	100

17. It's hard to get a handle on the benefits of energy efficient cooking equipment without a lot of work.

    What number would you give for refrigeration equipment?

    For hoods?

Response	Frequency of Response Cooking		Frequency of Response Refrigeration		Frequency of Response Ventilation	
	N	%	N	%	N	%
1	0	0.0	0	0.0	1	9.09
2	2	18.18	1	9.09	1	9.09
3	0	0.0	0	0.0	2	18.18
4	1	9.09	1	9.09	1	9.09
5	2	18.18	1	9.09	1	9.09
6	1	9.09	1	9.09	0	0.0
7	2	18.18	5	45.45	3	27.27
8	2	18.18	2	18.18	2	18.18
9	0	0.0	0	0.0	0	0.0
10	1	9.09	0	0.0	0	0.0
Don't Know	0	0.0	0	0.0	0	0.0
Total	11	99.99	11	99.99	11	99.99

18. Determining if an energy efficient piece of cooking equipment would be worthwhile to put in our designs requires too many resources.

    What number would you give for refrigeration equipment?

    For hoods?

Response	Frequency of Response Cooking		Frequency of Response Refrigeration		Frequency of Response Ventilation	
	N	%	N	%	N	%
1	0	0.0	0	0.0	0	0.0
2	0	0.0	0	0.0	0	0.0
3	1	9.09	0	0.0	0	0.0
4	0	0.0	0	0.0	0	0.0
5	0	0.0	0	0.0	0	0.0
6	0	0.0	0	0.0	0	0.0
7	1	9.09	4	36.36	1	9.09
8	1	9.09	1	9.09	2	18.18
9	2	18.18	0	0.0	2	18.18
10	6	54.55	6	54.55	6	54.55
Don't Know	0	0.0	0	0.0	0	0.0
Total	11	100	11	100	11	100

19. It is difficult to put energy efficient cooking equipment in my design since it is not always available.

    What number would you give for refrigeration equipment?

    For hoods?

Response	Frequency of Response Cooking		Frequency of Response Refrigeration		Frequency of Response Ventilation	
	N	%	N	%	N	%
1	3	27.27	3	27.27	3	27.27
2	3	27.27	3	27.27	3	27.27
3	2	18.18	2	18.18	3	27.27
4	0	0.0	0	0.0	0	0.0
5	2	18.18	2	18.18	1	9.09
6	0	0.0	0	0.0	0	0.0
7	1	9.09	0	0.0	0	0.0
8	0	0.0	1	9.09	1	9.09
9	0	0.0	0	0.0	0	0.0
10	0	0.0	0	0.0	0	0.0
Don’t Know	0	0.0	0	0.0	0	0.0
Total	11	99.99	11	99.99	11	99.99

20. How do you generally seek out information on the energy efficiency or production efficiency of equipment that you specify for you clients?

Q20
Go to the manufacturers – multiple manufacturers and evaluate the system
from the manufacturers reps
Manufacturers information
Product literature, trade shows, catalogs
Have a great source in the manufacturers that they deal with - manufacturers
If its an issue ask the rep or the manufacturer – no common standard way to show energy efficiency – clients don't really care anyway
Consult the manufacturer
Directly from the manufacture, will go to 2 manufactures and compare the results.
Usually from the manufacturers representative
Start with the factory representative, sometimes I talk to other consultants.
Spend a lot of time with Foodservice Equipment Reports, experience, service agencies, listen to manufactures reps.

Now I have a few general questions.

21. Have you ever heard of PG&E's Food Services Technology Center (the Center)?

- ❑ Yes
- ❑ No (GO TO 29)
- ❑ DK (GO TO 29)

Response	Frequency of Response	
	N	%
Yes	7	63.64
No	4	36.36
Don't Know	0	0.0
Total	11	100

22. Where did you hear about the Center?

❑ Manufacturer ❑ Publication ❑ Trade Show

❑ Other End User ❑ Utility ❑ Dealer

❑ Other: ____________________

Response	Frequency of Response	
	N	%
Manufacturer	0	0.0
Publication	2	28.57
Trade Show	0	0.0
Other End User	0	0.0
Utility	0	0.0
Dealer	0	0.0
Other	5	71.43

Other Responses:

Q22
Been aware of it since it began
Knew Betty Ferlin from long time back
From Carl Vail
Trade Association meeting
Betty Ferlin

23. Have you ever been contacted by the Center regarding energy efficient equipment?

- ❑ Yes (If yes, how many times over the last three years?____) 23a
- ❑ No (GO TO 0)
- ❑ DK (GO TO 0)

Response	Frequency of Response	
	N	%
Yes	1	14.29
No	6	85.71
Don't Know	0	0.0
Total	7	100

24. What was the reason the Center contacted you?

Q24
Asked them to a function there

25. Have you ever contacted the Center regarding the performance of equipment?

- ❑ Yes (If yes, how many times over the last three years?____) 25a
- ❑ No (GO TO 0)
- ❑ DK (GO TO 0)

Response	Frequency of Response	
	N	%
Yes	1	14.29
No	6	85.71
Don't Know	0	0.0
Total	7	100

26. What was the typical reason you contacted the Center?

Q26
New technology

27. Do you know anyone in the restaurant business who has ever attended an activity at the Center?

- ❑ Yes
- ❑ No (GO TO 29)
- ❑ DK (GO TO 29)

Response	Frequency of Response	
	N	%
Yes	1	14.29
No	6	85.71
Don't Know	0	0.0
Total	7	100

28. What was their overall impression of what they learned at the Center?

Q28
Thought the place was impressive

29. Have you ever heard of the American Society for Testing and Materials, often referred to as the ASTM?

- ❑ Yes
- ❑ No (GO TO 35)
- ❑ DK (GO TO 35)

Response	Frequency of Response	
	N	%
Yes	9	81.82
No	2	18.18
Don't Know	0	0.0
Total	11	100

30. Where did you hear about the ASTM? (Multiple Answers Allowed)

- ❑ Manufacturer ❑ Publication ❑ Trade Show
- ❑ Other End User ❑ Utility ❑ Dealer
- ❑ Other: ____________________

Response	Frequency of Response	
	N	%
Manufacturer	2	22.22
Publication	0	0.0
Trade Show	3	33.33
Other End User	0	0.0
Utility	0	0.0
Dealer	0	0.0
Other	5	55.56

Other Responses:

Q30A
Occasionally require testing of different equipment – resource then
Last thirty some years
Equipment specifications, you always see it
Known about them for 30 years
One of the standards we specify in some equipment types

31. Have you ever been contacted by the ASTM regarding equipment performance standards?

- ❑ Yes (If yes, how many times over the last three years? ____) 31a
- ❑ No (GO TO 33)
- ❑ DK (GO TO 33)

Response	Frequency of Response	
	N	%
Yes	0	0.0
No	9	100.0
Don’t Know	0	0.0
Total	9	100

32. What was the reason the ASTM contacted you?

33. Have you ever contacted the ASTM regarding the performance of equipment?

❑ Yes (If yes, how many times over the last three years?____) 33a

❑ No (GO TO 35)

❑ DK (GO TO 35)

Response	Frequency of Response	
	N	%
Yes	0	0.0
No	9	100.0
Don't Know	0	0.0
Total	9	100

34. What was the reason you contacted the ASTM?

35. There are standard test methods adopted by the ASTM which provide accurate, reproducible results on production efficiency and energy efficiency for different pieces of kitchen equipment (i.e., griddles, ovens, fryers). How aware are you of those methods?

❑ Not at all aware (GO TO 40)

❑ Somewhat aware

❑ Very aware

❑ DK (GO TO 40)

Response	Frequency of Response	
	N	%
Not at all aware	7	63.64
Somewhat aware	4	36.36
Very aware	0	0.0
Don't Know	0	0.0
Total	11	100

36. How did you hear of these testing methods?

- ❑ FSTC
- ❑ Publication
- ❑ Trade Show
- ❑ Manufacturer
- ❑ Utility
- ❑ ASTM
- ❑ Other Designer
- ❑ Other:

Response	Frequency of Response	
	N	%
FSTC	0	0.0
Publication	1	25.0
Trade Show	0	0.0
Manufacturer	0	0.0
Utility	0	0.0
ASTM	0	0.0
Other Designer	0	0.0
Other	3	75.0

Other Responses:

Q36A
don't really remember
Publications and in manufacturer catalogs
architects, engineers

37. How many times have you offered your customers information on how specific pieces of equipment scored on these tests?

Response	Frequency of Response	
	N	%
0	4	100.0

38. How many times have your customers asked about how specific pieces of equipment scored on these tests?

Response	Frequency of Response	
	N	%
0	4	100.0

39. How many times have you asked dealers or manufacturer representatives about how specific pieces of equipment scored on *these tests* before considering them?

Response	Frequency of Response	
	N	%
0	2	50.0
2	1	25.0
3	1	25.0

40. Over the last several years, how many times have tried to sell your colleagues in the restaurant business on the *idea* of energy efficient restaurant equipment?

Response	Frequency of Response	
	N	%
0	6	54.55
2	1	9.09
3	1	9.09
6	2	18.18
15	1	9.09
Total	11	100

41. How many times have you asked your dealers, manufacturers, or their representatives about cooking equipment that saves energy?

Response	Frequency of Response	
	N	%
0	4	36.36
1	1	9.09
3	1	9.09
5	1	9.09
6	2	18.18
12	1	9.09
24	1	9.09
Total	11	99.99

42. How about refrigeration equipment which saves energy?

Response	Frequency of Response	
	N	%
0	3	27.27
1	1	9.09
3	3	27.27
4	1	9.09
9	1	9.09
12	2	18.18
Total	11	99.99

43. How about ventilation equipment which saves energy?

Response	Frequency of Response	
	N	%
0	2	18.18
1	2	18.18
2	1	9.09
3	2	18.18
6	1	9.09
12	1	9.09
15	1	9.09
20	1	9.09
Total	11	99.99

44. How many times have you discussed with your customers the energy efficiency of cooking equipment?

Response	Frequency of Response	
	N	%
0	4	36.36
3	2	18.18
10	2	18.18
12	1	9.09
15	1	9.09
24	1	9.09
Total	11	99.99

45. How many times have your customers asked about the energy efficiency of cooking equipment?

Response	Frequency of Response	
	N	%
0	3	27.27
1	2	18.18
2	1	9.09
3	2	18.18
6	1	9.09
8	1	9.09
10	1	9.09
Total	11	99.99

46. How many times have you discussed with your customers the energy efficiency of refrigeration equipment?

Response	Frequency of Response	
	N	%
0	4	36.36
1	1	9.09
3	1	9.09
8	1	9.09
12	2	18.18
15	2	18.18
Total	11	99.99

47. How many times have your customers asked about the energy efficiency of refrigeration equipment?

Response	Frequency of Response	
	N	%
0	6	54.55
2	2	18.18
3	1	9.09
4	1	9.09
15	1	9.09
Total	11	100

48. How many times have you discussed with your customers the efficiency of ventilation equipment?

Response	Frequency of Response	
	N	%
0	2	18.18
2	1	9.09
3	2	18.18
4	2	18.18
6	1	9.09
15	1	9.09
35	1	9.09
36	1	9.09
Total	11	99.99

49. How many times have your customers asked about the efficiency of ventilation equipment?

Response	Frequency of Response	
	N	%
0	3	27.27
2	1	9.09
3	3	27.27
4	1	9.09
5	1	9.09
12	1	9.09
35	1	9.09
Total	11	99.99

50. When designing a kitchen, what aspects do you give the highest priority? (Don't Read, check as they talk) (More than one answer allowed)

- ❑ UL Listing
- ❑ Flow of work space
- ❑ Efficiency
- ❑ Looks
- ❑ Reliability of equipment
- ❑ Price
- ❑ Other:

Response	Frequency of Response	
	N	%
UL Listing	0	0.0
Flow of Work Space	2	18.18
Efficiency	0	0.0
Looks	0	0.0
Reliability	0	0.0
Price	0	0.0
Other	9	81.82
Total	11	100

Other Responses:

Q50A
ability to perform the task, reliability, efficiency, ease of use
employee efficiency (minimizing staff), efficiency of product flow, conservation of space, meeting a budget (if established), accommodating the production requirements of the kitchen, accommodating the menu
reliability of equipment, safety, energy, suitability
ventilation
must meet the needs of the program
reliability of equipment, serviceability, cost
flow of work space; function, size, that it fits in, reputations for maintenance
flow of work space, ease of cleaning
reliability of equipment, the menu, parts availability, service availability, energy efficiency, price

51. What percent of the time do you recommend equipment that saves your customer energy ?

Q51
80%
90%
100% when aware of it and believe , manufacturer of hoods maintain that a short cycle hood is EE, but don't feel they really work
Don't know how to answer the question. We do it everyday but only as part of the rest of the work.
90%
0%
50%
0%
5%
0%
60%

52. What percent of the time does your customer request equipment that saves energy?

Q52
0%
10%
15%
0% - They look for the equip that does the job. They really aren’t interested in energy efficiency in general
10%
1%
2-3%
0%
5%
0%
15%

53. Have you ever heard of the magazine, *Foodservice Equipment Reports*?

- ❑ Yes
- ❑ No (GO TO 55)
- ❑ DK (GO TO 55)

Response	Frequency of Response	
	N	%
Yes	10	90.91
No	1	9.09
Don’t Know	0	0.0
Total	11	100

54. Do you currently receive the *Foodservice Equipment Reports*?

- ❑ Yes
- ❑ No
- ❑ DK

Response	Frequency of Response	
	N	%
Yes	9	90.0
No	1	10.0
Don’t Know	0	0.0
Total	10	100

55. What are the most important factors for your customers in selecting the cooking, refrigeration, and ventilation equipment?

Q55
Certain amount of emotional things involved (dishwashers and icemakers, especially)– cooks have certain brands and types that they want ("my people trained on X and want that no matter what") – can I get if fixed if it breaks down? (look at service agencies) – have arranged for their customers to visit sites with equipment having problems so they can see it for themselves – not really brand sensitive
Cost, serviceability, reputation of manufacturer, locale of the service agencies
Adequate for their requirement, initial costs
First, whether it will do what they want done, then, is the right price.
Serviceability, efficiency is something that they stress
They don't care generally although someone like a country club may want a specific brand
Utility of the equipment, experience
Manufacturer (brand), durability, serviceability, cost. Their experience, overall, service. Service of equipment is one of the biggest.
Price and maintenance
Depends on the type of customer. Hospitals want the best of everything, all stainless, all the specs, not budget limited generally. Most other customers it boils down to the final cost. They want good equipment but not usually willing to pay the freight.
Price, but when push comes to shove, they want your advice to get the right equipment with good durability at the right price.

56. On a scale of 1 to 10, with 1 being very low priority, where do you think your customers rate energy efficiency in their decisions to purchase equipment?

Response	Frequency of Response	
	N	%
1	2	18.18
2	3	27.27
3	1	9.09
4	2	18.18
5	0	0.0
6	2	18.18
7	1	9.09
8	0	0.0
9	0	0.0
10	0	0.0
Don’t Know	0	0.0
Total	11	99.99

57. What are you customers priorities when purchasing your equipment?

Q57
utility - will it do the job
cost
Amount of space available, budget, that the kitchen accomplishes what they need it to do – if EE is brought up often it is because it is a governmental unit must meet the specs from the government, however, they have no way of measuring if it actually is EE or not, so it is sort of political -If gas available, and a piece of equipment can use that, the person surveyed would generally (90% of the time) specify that in place of electric
First, whether it will do what they want done, then, is the right price.
Function, cost, serviceability is the most important
Dependability, first cost, capacity
Utility of it
Manufacturer (brand), durability, serviceability, cost
Price and maintenance
Cost and equipment life. Want it to do more than one thing. High utilization.
Want to get what we specify for the least cost

58. What kinds of changes do you think would be necessary in your market to make energy efficiency a high priority when a customer thinks about buying equipment?

Q58
If OPEC strikes any harder than it just has, then they will hear about it again – some people get receptive all of a sudden when energy prices go up
The only way to make an impact on the end user is when the utility bill gets so high what they rationalize out what it takes to operate a piece of equipment. If they put a sticker on it saying “using X kWh or therms per year or costs X$ per year” would help. Refrigeration especially.
Some sort of understandable way to standardize – a standard rating system – challenge is that not sure if there is such a way to do that and the manufacturers have to pay another entity to test their equipment, feel people would have to subscribe to it only voluntarily, ill feelings when have to pay yet another agency to test their equipment – BUT would be handy – an example – a fryer manufacturer says how much gas used and how much goes into the product; but some other fryer manufacturers say here is a 120,000 Btu fryer and here is our EE 90,000 Btu fryer, but they fail to mention that the first one can cook 30 chicken patties while the second can only cook 6 patties at a time.
Fuel price would need to double, most of my client base don’t watch their energy costs. Fuel is so cheap they don’t care how much it uses.
Hard to answer, left up to them as the designer since that is what they are hired for, most clients are naïve about what is out there and depend on their expertise to specify the most EE as well as the most efficient piece of equipment for their use.
High energy costs – print some sort of very clear energy rating that is a comparable unit between units, would be easier to select equipment based on EE, but doubt that the client would do it unless energy costs are very high – institutions don’t really care about EE since they often are dealing with the whole building costs, not just the kitchen – different priorities by the client (e.g., schools want nutritious food for the kids, country clubs want high quality tasting food)
Energy costs
If the cost of energy skyrocketed, then they will pay attention. We address it more for dish machine. Much of it is due to lack of readily available information. Could be selling point for us. Labeling could help.
Most of them don’t know what their energy costs are. They are not usually separately metered. They are at peak demand. What would change the market for us is an easy way to calculate real saving from energy efficient equipment. An actual dollar based on what they pay for their energy, not kw or btu. That way they could figure the payback.
The customer would have to be made more aware of the importance of energy efficiency. Don’t know how to make that happen. I have many criteria when selecting

equipment, so I try to specify the equipment that I know, The consultant or designer can control this, so they need to understand the savings so that they can pass it on the customer. If there is a good reason that wouldn't be too hard for the customer to understand, then that would be a helpful tool for the designer. I think a good way to change the market would be through the designers.
How flexible is the piece of equipment, labor first, then energy cost. Education of the end user, on energy efficiency and its value. Cost of energy would have to go up.

That completes this survey. On behalf of PG&E, I thank you for your time.

Comments
They attended once or twice a year before three years ago, lately they have not been advised that things are going on - don't ask about Cooking EE because they don't change it very often – improvements in efficiency come in spasms – haven't seen any activity in the last two years - however, for ventilation they are More aggressive about this end use – important for the processors - as far as vent EE Comply with AQMD and have to move that amount – no way to change that – ME are more concerned about saving the $ for energy, but not doing the job – have to get the maximum utility out of the hood – don't believe that it adequately provides the ACH required – not worth the $
Ask about equipment when since publications have come out are aware of them and can ask – manufacturer will say it if they do good on the tests - his compadres don't talk about EE, they worry about the competition - he feels that he and ME's get into semi-arguments with them, they set one way – they are clueless about EE and just spec to the building code which is too high
Routinely specify EE and not talk to client about it which is why it shows that he doesn't bring it up as much as the client.
They have a particular manufacturer that deal with all the time that are EE and so don't have to ask about it
Ventilation is a different animal, engineers are concerned with how much air it has to suck out and there is always a fight between them and the engineers since they are air-conditioning the space
Efficiency is not as important to corporations (who are most of his customers), may be more important to the small guy who is looking at every dollar.

Finish Time __________

Appendix F
Final Manufacturer Interview and Responses

Company Name ________________________ Phone #: ___________

Contact Name __________________________ Time Start___________

Good (morning/afternoon). My name is ____________________. I am calling on behalf of Pacific Gas and Electric Company. We are conducting a survey about how the food service sector looks at energy efficiency. The results of the study are to be reported to the California Public Utilities Commission. The survey will take approximately 15 to 20 minutes. Your responses will be kept confidential.

May I proceed?

1. Does your company manufacturer equipment used by the food service market?

   ❑ Yes

   ❑ No (Thank and Terminate)

Response	Frequency of Response	
	N	%
Yes	11	100
No	0	0

A good portion of the interview questions request quantifiable responses, however I would like you to feel free to expand on you answers as you see appropriate. What we are trying to understand is how the market for energy efficient kitchen equipment works, or doesn't work.

2. What is your title?

   ❑ Sales Rep. ❑ Engineer ❑ Manager

   ❑ President ❑ Other: ____________________

Response	Frequency of Response	
	N	%
Sales Rep	0	0.0
Engineer	0	0.0
Manager	3	27.27
President	0	0.0
Other	8	72.73
Total	11	100

Other Responses:

Q2A
Vice President, global sales and marketing
Vice President, marketing
Director of Corporate Communications
Corporate Communications Manager
Product Manager
Group Director of Marketing
Marketing Director
VP of marketing

3. What are your primary responsibilities? ______________________________________

Q3
responsible for sales and marketing of our equipment worldwide
determine advertising, lead company in what new products to develop, hire sales reps
advertising and public relations, trade shows, literature
advertising, public relations
development and marketing of product line
look after all brand intellectual trademarks in the group (which is global), advertising, make sure a consistent corporate message gets out
product development
sales and marketing
Run the advertising department, manager all of our publishing
new products, graphics, company vision
marketing communication, sales support

4. Our records indicate that you manufacture cooking equipment. If this true?

   ❑ Yes

   ❑ No (Specify why: ______________________________________)

Response	Frequency of Response	
	N	%
Yes	11	100
No	0	0

5. Are there any other types of equipment that you manufacturer for this sector?
   - ❑ Cooking
   - ❑ Refrigeration
   - ❑ Ventilation
   - ❑ No other types
   - ❑ Other: ____

Response	Frequency of Response	
	N	%
Cooking	0	0.0
Refrigeration	1	9.09
Ventilation	1	9.09
No Other Types	6	54.55
Other	3	27.27
Total	11	100

Other Responses:

Q5A
conveyor toasters, ovens, cheese melters, food holders
blast chillers
Ventilation under the another company
shelving
cool well equipment

6. Would you please describe how you market your equipment?

Q6
through legitimate food equipment dealers worldwide
our main emphasis is quality, reliability, and longevity. We go after value.
Through a rep sales force - independent reps to dealers to end user - reps also call direct on the end user - sometimes target a chain differently (more sales rep time)
trade magazines advertising, trade shows, direct demonstrations
Go through distribution
Direct basis, sales agencies – employee print advertising and direct mail campaigns
Through authorized equipment dealers, ad in magazines, trade shows
manufacturer reps
Manufactures only one line of cooking products, conveyor grills that use infrared burners top and bottom. They occupy a niche market selling only to a limited number of fast food chains. They target the fast food, high volume chains for direct sales. They do no general advertising
Work through dealer, also sell directly to some chain customers
Manufacturers representatives, dealers, distributors, magazines, trade shows

7. What different ways does your product get to the end user?

Q7
equipment dealers, end user can find out about it through dealers, designers, trade shows, internet, trade magazines
Food equipment dealers; direct to some chains. Dealers don't have much to offer to chains. We really don't care to deal direct unless the chain is set up to handle it. Buying groups are always a factor. They come in all sizes for all types of customers. Most manufactures would rather that buying groups didn't exist. Very few aid sellers in buying the equipment that they need. Their prime purpose is to drive down cost. We only belong to one buying group
Through a rep sales force - independent reps to dealers to end user - reps also call direct on the end user - sometimes target a chain differently (more sales rep time)
Series of manufacturer reps to dealers to end user - Retail division (supermarket, convenience stores) distributor and then to end user - Manuf rep (food service division) to dealers to end users - Chains on an individual basis with each different
Dealers exclusively - some chain (large customer) are sold direct – always involve the distributor
2 ways – direct purchase to a dealer or through a dealer
dealers, buying groups, direct with large chains
equipment dealers, sales reps
We use distributors, 45 domestic and 40 international. When asked, he differentiated a distributor from a dealer by saying that they have developed relationships with dealers that supply installation, training, and equipment service in addition to selling the product. Dealers in his mind only sell the products. They do not sell direct to the end user. They often negotiate price directly with the end users, but the product is always purchased through the dealers. This is preferable for both the user and the dealer because the user gets the central pricing agreement, but then establishes a relationship with the dealer involving installation, training, and service.
Distributors, and Buying groups
Dealers, distributors, direct to major chains or military or international marine.

8. Compared to other companies like yours, would you consider yourself to be small, medium or large in terms of revenue?

❑ Small ❑ Medium ❑ Large

Response	Frequency of Response	
	N	%
Small	2	18.18
Medium	5	45.45
Large	4	36.36
Total	11	99.99

We are particularly interested in understanding how decisions are made regarding the manufacturing of specific pieces of equipment. I am going to read a list of statements. Please indicate, on a scale of 1 to 10, whether you agree or disagree. A 1 means you strongly disagree and a 10 means you strongly agree.

9. The most important operational issue for our company is keeping our development costs for new equipment under control.

______________❑ DK

Response	Frequency of Response	
	N	%
1	1	9.09
2	1	9.09
3	1	9.09
4	0	0.0
5	2	18.18
6	0	0.0
7	2	18.18
8	4	36.36
9	0	0.0
10	0	0.0
Don’t Know	0	0.0
Total	11	99.99

10. Investing extra money in the manufacture of energy efficient equipment would reduce our ability to take advantage of other opportunities to invest in productions or sales efforts.

_____________ ❑ DK

Response	Frequency of Response	
	N	%
1	2	18.18
2	1	9.09
3	3	27.27
4	1	9.09
5	0	0.0
6	2	18.18
7	0	0.0
8	0	0.0
9	0	0.0
10	1	9.09
Don’t Know	1	9.09
Total	11	99.99

11. I don’t see any reason to be proactive about energy efficiency in today’s economy.

_____________ ❑ DK

Response	Frequency of Response	
	N	%
1	3	27.27
2	2	18.18
3	3	27.27
4	1	9.09
5	0	0.0
6	0	0.0
7	1	9.09
8	0	0.0
9	0	0.0
10	1	9.09
Don’t Know	0	0.0
Total	11	99.99

12. Determining if an energy efficient piece of equipment would be marketable requires too many resources.

_____________❑ DK

Response	Frequency of Response	
	N	%
1	3	27.27
2	0	0.0
3	3	27.27
4	1	9.09
5	1	9.09
6	0	0.0
7	0	0.0
8	2	18.18
9	0	0.0
10	0	0.0
Don't Know	1	9.09
Total	11	99.99

13. The people who benefit most from energy efficient equipment seldom have influence in the purchase decision.

_____________❑ DK

Response	Frequency of Response	
	N	%
1	2	18.18
2	2	18.18
3	1	9.09
4	1	9.09
5	3	27.27
6	0	0.0
7	0	0.0
8	2	18.18
9	0	0.0
10	0	0.0
Don't Know	0	0.0
Total	11	99.99

14. Energy efficient equipment is generally less reliable than standard equipment.

_____________❑ DK

Response	Frequency of Response	
	N	%
1	6	54.55
2	2	18.18
3	1	9.09
4	0	0.0
5	0	0.0
6	0	0.0
7	0	0.0
8	0	0.0
9	0	0.0
10	0	0.0
Don't Know	2	18.18
Total	11	100

15. I don't see how we can recover the extra cost of manufacturing energy efficient equipment by increased prices given today's low energy costs.

_____________❑ DK

Response	Frequency of Response	
	N	%
1	3	27.27
2	1	9.09
3	1	9.09
4	1	9.09
5	1	9.09
6	0	0.0
7	1	9.09
8	2	18.18
9	0	0.0
10	1	9.09
Don't Know	0	0.0
Total	11	99.99

16. It is difficult to find a market for energy efficient equipment.

_____________ ❑ DK

Response	Frequency of Response	
	N	%
1	3	27.27
2	3	27.27
3	0	0.0
4	0	0.0
5	2	18.18
6	0	0.0
7	2	18.18
8	0	0.0
9	1	9.09
10	0	0.0
Don't Know	0	0.0
Total	11	99.99

17. Does your company offer any energy efficient equipment?

Response	Frequency of Response	
	N	%
Yes	9	81.82
No	2	18.18
Total	11	100

Q17
Yes
Yes - induction cooking equipment
Yes - pay attention to for both (manufacture more gas than electric)
Yes – biggest energy efficient is the low-temp cooking and holding oven – WI electric Power Co indicated ½ to 1/3 the cost of operating a standard electric oven only available in electric Do manufacture natural gas oven/steamer in gas – their studies show that gas is more EE than electric
No
Offer both gas and electric – depending on what is efficient for the customer in their Environment – electrical equipment (ranges) are more energy efficient, designed specifically for the European market with EE in mind – induction cooking is being looked into
Yes - both gas and electric, savings with newer gas equipment
Yes
Yes, we offer a modulation valve on most of our products that automatically turns down the heat when the unit isn’t in use, then turns it up when use is required.
No
Yes. Quite often large customers see gas as efficient, and choose between gas and electric based on this perception. On all of our products we use a lot of insulation, more than other manufacturers. This makes them more efficient.

17a. Do you market it differently than your other equipment? 17b. If yes, how?

Q17A
Uses forced convection with quartz elements, requires us to sell that feature. If a customer understands operating costs, then it is important to them. Chains are much better at understanding operating costs than independents
No
No
Most is marketed from the energy efficiency standpoint (except the blast chiller) – do promote the energy efficiency part of their equipment.
Not really – it's always noted that it is EE, but proscribe that all are efficient, state if definable difference
Yes steam cooking manufacturer - market as cooking faster an more efficiently (making steam more efficiently)
Yes in our ads and trade shows
No
No, we consider most of our equipment efficient, and we market it all the same.

Now I have a few general questions.

18. Pacific Gas & Electric operates the Food Service Technology Center in San Ramon California. The Center conducts food service research and testing of equipment including cooking, refrigeration, and ventilation equipment. It also conducts a variety of workshops, seminars and conferences on the results of its research and testing. Have you ever heard of PG&E's Food Service Technology Center?

- ❑ Yes
- ❑ No (GO TO 23)
- ❑ DK (GO TO 23)

Response	Frequency of Response	
	N	%
Yes	8	72.73
No	3	27.27
Don't Know	0	0.0
Total	11	100

19. Where did you hear about the Center?

Q19
Our company has been involved in it for a long time. Got involved way back when Bettie Ferlin was involved. The Center has done a lot of testing of our equipment for us
Through the industry
Received literature from them - saw an article in a magazine on benefits of filtration for fryers
Over the years, working here - knew Bettie Ferlin
Our manufacturer rep
The VP of sales has worked with them a number of times over the years
Magazines, Food Service Equipment Reports
We participate with them by supplying equipment for the test kitchen at the FSTC.

20. How many times have you attended the Center? _____

Response	Frequency of Response	
	N	%
0	8	72.73
1	2	18.18
6	1	9.09
Total	11	100

21. How many times have you received information from the Center? _____

Response	Frequency of Response	
	N	%
0	5	45.45
1	2	18.18
2	1	9.09
4	1	9.09
6	1	9.09
Other	1	9.09
Total	11	99.99

22. What is your primary connection with the Center?

Q22
Personally, this person has been to the center, but a long time ago. The engineers go there frequently and the company gets information frequently. We work with them on testing and development of equipment.
FSTC has tested their equipment
Use of their information - would love to get more
Currently, his company has a combi-oven at FSTC for testing, their local reps use FSTC, they have a chef using FSTC, and other people probably see info on the center and, obviously, go there, but this individual does not
We had comparison tests on our countertop steamers against the competition done there
Usually doing comparative testing of our equipment with similar equipment
Read about it in a magazine
We have equipment in their kitchen.

IF VENTILATION OR REFRIGERATION MANUFACTURER, GO TO QUESTION 30

23. The American Society for Testing and Materials (the ASTM) has test methods which provide accurate, reproducible results providing production efficiency and energy efficiency for different pieces of kitchen equipment (i.e., griddles, ovens, fryers). How aware are you of those methods?

- ❑ Not at all aware (GO TO 27)
- ❑ Somewhat aware
- ❑ Very aware
- ❑ DK (GO TO 27)

Response	Frequency of Response	
	N	%
Not at all aware	3	27.27
Somewhat aware	5	45.45
Very aware	3	27.27
Don’t Know	0	0.0
Total	11	99.99

24. How did you hear of these testing methods? (Multiple Answers Allowed)

❑ FSTC ❑ Publication ❑ Trade Show

❑ Other Manufacturer ❑ Utility ❑ ASTM

❑ Other: ___________________

Response	Frequency of Response	
	N	%
FSTC	0	0.0
Publication	1	12.5
Trade Show	0	0.0
Other Manufacturer	0	0.0
Utility	1	12.5
ASTM	0	0.0
Other	6	75.0
Total	8	100

25. Do your dealers or manufacturer representatives have customers asking about how specific pieces of equipment scored on these tests?

❑ Yes

❑ No

❑ DK

Response	Frequency of Response	
	N	%
Yes	1	12.5
No	2	25.0
Don’t Know	5	62.5
Total	8	100

26. How actively does your company incorporate the ASTM testing methods in your manufacturing process?

- ❑ Very
- ❑ Somewhat
- ❑ Not at all
- ❑ DK

Response	Frequency of Response	
	N	%
Very	4	50.0
Somewhat	0	0.0
Not at all	1	12.5
Don’t Know	3	37.5
Total	8	100

27. Has your company developed in-house efficiency testing methods for the equipment that you manufacture?

- ❑ Yes
- ❑ No (GO TO 30)
- ❑ DK (GO TO 30)

Response	Frequency of Response	
	N	%
Yes	8	72.73
No	3	27.27
Don’t Know	0	0.0
Total	11	100

28. Which equipment do you use the in-house testing methods on? ___________________

Q28
All equipment (bust mainly for UL and NSF testing)
Low temp cook and hold ovens
Fryers - worked with SCG to do some testing
Everything
Some of the newer products, and design changes on old products
Steamers
We only have one line of equipment, so it is on that equipment
All of them

29. How actively does your company incorporate those in-house testing methods in your manufacturing process?

- ❑ Very
- ❑ Somewhat
- ❑ Not at all
- ❑ DK

Response	Frequency of Response	
	N	%
Very	6	75.0
Somewhat	2	25.0
Not at all	0	0.0
Don’t Know	0	0.0
Total	8	100

30. When attempting to sell your product, what features do you promote most? (Can choose more than one answer)
    - ❑ UL Listing
    - ❑ Options available
    - ❑ Efficiency
    - ❑ Looks
    - ❑ Reliability
    - ❑ Price
    - ❑ Other:____

Response	Frequency of Response	
	N	%
UL Listing	0	0.0
Options Available	0	0.0
Efficiency	2	11.11
Looks	0	0.0
Reliability	5	27.78
Price	1	5.56
Other	10	55.56
Total	18	100

Other Responses:

Q30A
Safety, productivity, versatility, after sales service
What it actually accomplishes for the actual user (chef), rather than what the owner may focus on
Performance, serviceability, dependability
Varies with the product - low-temp cook and hold uses the fact that it reduces product shrinkage
Those that the customer feels are most important – more power is better – higher BTU is better, long term structural integrity of the unit, cleanability of it (all stainless)
They sell the solution that it provides the customer, better heat, instant heat applications related and operational cost efficiencies versus other fuel forms or other cooking formats
That gas equipment has an increase in efficiency and improved cooking performance

Ease of use, ease of operation, ease of maintenance
Versatility, ease of use, safety
Consistency in the quality of the finished product

31. What percent of the time does your rep or the dealer or designer which carries your product recommend equipment which saves energy to your customer?

____________________ ❑ DK

Response	Frequency of Response	
	N	%
>=75%	2	18.18
>=50% to 75%	1	9.09
>=25% to 50%	0	0.0
<25%	3	27.27
Don’t Know or NA	5	45.45
Total	11	99.99

Q31
50%
<5%
Don't know
Don't know
2%
80%
80-90%
20%
NA because we consider all our equipment energy efficient
Don't know
Don't know

32. Over the last few years, has this percentage decreased, increased, or remained about the same?

- ❑ Decreased
- ❑ Increased
- ❑ Remained the Same
- ❑ DK

Response	Frequency of Response	
	N	%
Decreased	2	18.18
Increased	3	27.27
Remained the Same	1	9.09
Don’t Know	5	45.45
Total	11	99.99

33. What percent of your customers request equipment that saves energy?

____________________ ❑ DK

Response	Frequency of Response	
	N	%
>=75%	4	36.36
>=50% to 75%	1	9.09
>=25% to 50%	0	0.0
<25%	3	27.27
Don’t Know or NA	3	27.27
Total	11	99.99

Q33
80%
<5%
Don’t know
Don't know
2%
85-90% want operation cost savings
50%
10%
100%
Don't know
75% choose gas over electric for energy cost reasons. They view it as energy efficiency reasons

34. Over the last few years, has this percentage decreased, increased, or remained about the same?
    - ❑ Decreased
    - ❑ Increased
    - ❑ Remained the Same
    - ❑ DK

Response	Frequency of Response	
	N	%
Decreased	1	9.09
Increased	3	27.27
Remained the Same	3	27.27
Don’t Know	4	36.36
Total	11	99.99

35. What percent of the equipment you manufacturer in a given year would you consider to be energy efficient?

__________ ❑ DK

Response	Frequency of Response	
	N	%
>=75%	5	45.45
>=50% to 75%	2	18.18
>=25% to 50%	0	0.0
<25%	2	18.18
Don't Know or NA	2	18.18
Total	11	99.99

Q35
100%
2%
60%
90%
10%
90%
60%
Our steam tech series of steamers
100%
0
100%

36. On a scale of 1 to 10, with 1 being very low priority, where do you think your customers rate energy efficiency in their decisions to purchase equipment?

Response	Frequency of Response	
	N	%
1	1	9.09
2	2	18.18
3	2	18.18
4	1	9.09
5	2	18.18
6	1	9.09
7	1	9.09
8	1	9.09
9	0	0.0
10	0	0.0
Don’t Know	0	0.0
Total	11	99.99

37. What <u>are</u> you customers priorities when purchasing your equipment?

Q37
Safety, efficiency productivity, reliability, versatility, after sales service1
How well the end product turns out
Price, reliability, dependability
Reliability
Price, reliability, and availability
Solution application (does it do what I want it to do), warranty, cost to operate, how much is it going to cost to purchase (informed buyer follows this route – some just want the price)
Reliability and efficiency
Reliability, after sales service, price
Reliability, ease of use, ease of setup, ability to produce the volume that they want to produce
Performance standards, productivity, reliability
Cost, reliability, consistent cooking product output.

38. What kinds of changes do you think would be necessary in your market to make energy efficiency a high priority when a customer thinks about buying equipment?

Q38
They want it so that if you put a piece of bread on the conveyor toaster, have it com one, toast, then shut off. Whether this will actually save energy or not is a good question. EE is high because square foot cost is high, so they look at what equipment want, then figure out what the operating cost is. Some markets are price driven (LA, NY, FL). Chains generally buy better quality equipment, looking specifically for the features that they want
Fuel cost going way up or a new technology [that dramatically reduces fuel consumption with the same heat output]. The common perception is that a blue flame is a blue flame. In the cooking area of the restaurant, the fuel costs are such a small portion of the total cost that most people do not consider it important. In the preparation area everything focuses on turning out the best product, efficiency is not important. In the peripheral areas such as dishwashing energy efficiency is more important because these areas are only seen as cost centers, so anything to reduce costs is important. Fast food chains are more interested in energy efficiency and can measure its effect, but they are not our primary market. We go after institutions and fine foods.
Larger chain customers would pay the most attention to efficiency - more studies as to what it is costing them and comparing this between rates, prove efficiency ratings
Already being done through the marketing that is going on in the market
Having more statistics available that are understandable by an end user
About as high as its going to get – solutions and applications are the most important – some of that can be interwoven with EE – for example, they are working on a griddle that heats quicker and more evenly - therefore more production and buy the way it is also more EE – sell the solution
Big cost savings to them
Utility companies marketing, rebate, etc.
Utility costs would have to skyrocket. The cost of operating our piece of machinery is just not high enough to warrant attention. They sell both gas and electric equipment. Most of the gas equipment is sold in the US while most of the electric equipment is sold overseas. They do not see any trend for energy efficiency in electrical vs. gas equipment. Their customers install the equipment based on the availability of fuel source. In follow up discussion he said that they have seen significant regulation by the AQMDs and feel that they have been unduly targeted because they do have a good device to reduce emissions. This lead to the mandating of these devices, since they had a solution.

Increase in energy cost, regulation to get them to pay attention.
Cost of fuel would have to rise.

That completes this survey. On behalf of PG&E, I thank you for your time.

Finish Time __________

Company Name ________________________ Phone #: ___________

Contact Name __________________________ Time Start___________

Good (morning/afternoon). My name is _____________________. I am calling on behalf of Pacific Gas and Electric Company. We are conducting a survey about how the food service sector looks at energy efficiency. The results of the study are to be reported to the California Public Utilities Commission. The survey will take approximately 15 to 20 minutes. Your responses will be kept confidential.

May I proceed?

1. Does your company manufacturer equipment used by the food service market?

❑ Yes

❑ No (Thank and Terminate)

Response	Frequency of Response	
	N	%
Yes	10	100
No	0	0

A good portion of the interview questions request quantifiable responses, however I would like you to feel free to expand on you answers as you see appropriate. What we are trying to understand is how the market for energy efficient kitchen equipment works, or doesn't work.

2. What is your title?

❑ Sales Rep. ❑ Engineer ❑ Manager

❑ President ❑ Other: ____________________

Response	Frequency of Response	
	N	%
Sales Rep	0	0.0
Engineer	0	0.0
Manager	0	0.0
President	0	0.0
Other	10	100.0
Total	10	100

Other Responses:

Q2A
National Sales Manager
Marketing Coordinator
Director of Marketing
National Sales Manager
Sales Manager
VP
Marketing Manager
VP
VP Marketing
Director of Marketing

3. What are your primary responsibilities? ___________________________________

Q3
Selling Equipment
Coordinating marketing
Marketing the product
Sales
Managing sales
Engineering marketing
Putting together marketing literature
Sales and marketing
Overseeing marketing
No answer

4. Our records indicate that you manufacture refrigeration equipment. If this true?

❑ Yes

❑ No (Specify why: ___________________________________)

Response	Frequency of Response	
	N	%
Yes	9	90.0
No	1	10.0
Total	10	100

Q4A
They manufacture insulated panels which are used in (among other things) refrigeration cases for grocery stores and fast food chains

5. Are there any other types of equipment that you manufacturer for this sector?
    - ❑ Cooking
    - ❑ Refrigeration
    - ❑ Ventilation
    - ❑ No other types
    - ❑ Other: ____

Response	Frequency of Response	
	N	%
Cooking	0	0.0
Refrigeration	0	0.0
Ventilation	0	0.0
No Other Types	4	40.0
Other	6	60.0
Total	10	100

Other Responses:

Q5A
Walk in coolers and freezers
Walk in coolers and freezers
Prefabricated panels for walk in refrigerators
Food preparation tables, heated warming cabinets
Beverage and heated coffee equipment
Ice machines

6. Would you please describe how you market your equipment?

Q6
Through consultants and dealers
They register with buying groups so and market directly to the buying groups and dealers. They do not market to end users.
Look for growth sectors in the food service industry, and targets them
95% of business is to new construction projects, designed by consultants. The consultants specify a type of system, so first element of their marketing strategy is to try and get products specified. There is a national group of manufacturer's reps who bring products to contractors and dealers, which is another way these are marketed. The almost never deal with end users directly, except for large national chains.
They distribute through independent reps, who target dealerships. Their policy is not to have contact with customers, big or small.
They market directly to consultants, architects, engineering, try not to deal with customers. The food service dealer is the entity that works directly with customers
Primarily through dealers, but also through distributors and catalogues. They are affiliated with numerous buying groups, and with some independent dealers. There are a few customers that come to them directly.
sales reps and distributors, seldom with end users
They market their product exclusively to distributors throughout the country. They do not interact with end users.
They market their product through distributors, but they also market directly to large end users.

7. What different ways does your product get to the end user?

Q7
Consultants and dealers work directly with customers. There is no difference in how products get to large and small customers
If a convenience store wants to purchase a cooler, they contact a dealer or buying group. In contacting a dealer, the dealer then goes to a buying group. The buying groups then contacts the manufacturer for a quote
They have independent reps and internal sales force, which they use for large and small customers
Primarily through dealers and contractors, who sell to general contractor. The general contractor then delivers the project directly to the owner
Generally a designer puts plans together, goes to equipment dealers for bids. The dealers then interact with the manufacturer's reps to fill the quote.
A consultant draws up a specification (which specifies brand). It is at this point that the product is sold. Then the customer goes to the dealer, who goes to the manufacturer.
Depends on whether it is new construction or retrofit. Different dealers specialize in different parts of the market. So if it is a retrofit, then a retrofit dealer will be the one to sell the product to the user. For new construction, it is a food service contractor.
The end users are typically supplied with the beverage refrigeration equipment by the beverage distributor (i.e. Coke or Pepsi). The beverage distributor would typically work with the manufacturer's sales reps and distributors.
End users contact a dealer, who then contacts a distributor. This seems to be fairly standard for their products, and does not change much.
Smaller customers would go to a distributor, larger customers would go directly to them. If there are designers or dealers in the distribution, they aren't aware of them.

8. Compared to other companies like yours, would you consider yourself to be small, medium or large in terms of revenue?

❑ Small ❑ Medium ❑ Large

Response	Frequency of Response	
	N	%
Small	2	20.0
Medium	6	60.0
Large	2	20.0
Total	10	100

We are particularly interested in understanding how decisions are made regarding the manufacturing of specific pieces of equipment. I am going to read a list of statements. Please indicate, on a scale of 1 to 10, whether you agree or disagree. A 1 means you strongly disagree and a 10 means you strongly agree.

9. The most important operational issue for our company is keeping our development costs for new equipment under control.

______________❑ DK

Response	Frequency of Response	
	N	%
1	0	0.0
2	0	0.0
3	1	10.0
4	0	0.0
5	5	50.0
6	0	0.0
7	1	10.0
8	0	0.0
9	1	10.0
10	2	20.0
Don't Know	0	0.0
Total	10	100

10. Investing extra money in the manufacture of energy efficient equipment would reduce our ability to take advantage of other opportunities to invest in productions or sales efforts.

_____________❑ DK

Response	Frequency of Response	
	N	%
1	1	10.0
2	1	10.0
3	2	20.0
4	0	0.0
5	2	20.0
6	2	20.0
7	0	0.0
8	0	0.0
9	0	0.0
10	0	0.0
Don't Know	2	20.0
Total	10	100

11. I don't see any reason to be proactive about energy efficiency in today's economy.

_____________❑ DK

Response	Frequency of Response	
	N	%
1	6	60.0
2	1	10.0
3	1	10.0
4	0	0.0
5	2	20.0
6	0	0.0
7	0	0.0
8	0	0.0
9	0	0.0
10	0	0.0
Don't Know	0	0.0
Total	10	100

12. Determining if an energy efficient piece of equipment would be marketable requires too many resources.

______________❑ DK

Response	Frequency of Response	
	N	%
1	2	20.0
2	1	10.0
3	5	50.0
4	1	10.0
5	1	10.0
6	0	0.0
7	0	0.0
8	0	0.0
9	0	0.0
10	0	0.0
Don't Know	0	0.0
Total	10	100

13. The people who benefit most from energy efficient equipment seldom have influence in the purchase decision.

______________❑ DK

Response	Frequency of Response	
	N	%
1	0	0.0
2	1	10.0
3	1	10.0
4	0	0.0
5	1	10.0
6	0	0.0
7	1	10.0
8	3	30.0
9	0	0.0
10	3	30.0
Don't Know	0	0.0
Total	10	100

14. Energy efficient equipment is generally less reliable than standard equipment.

_____________❑ DK

Response	Frequency of Response	
	N	%
1	5	50.0
2	3	30.0
3	0	0.0
4	2	20.0
5	0	0.0
6	0	0.0
7	0	0.0
8	0	0.0
9	0	0.0
10	0	0.0
Don't Know	0	0.0
Total	10	100

15. I don't see how we can recover the extra cost of manufacturing energy efficient equipment by increased prices given today's low energy costs.

_____________❑ DK

Response	Frequency of Response	
	N	%
1	0	0.0
2	3	30.0
3	2	20.0
4	0	0.0
5	0	0.0
6	0	0.0
7	3	30.0
8	1	10.0
9	0	0.0
10	0	0.0
Don't Know	1	10.0
Total	10	100

16. It is difficult to find a market for energy efficient equipment.

_____________❑ DK

Response	Frequency of Response	
	N	%
1	1	10.0
2	3	30.0
3	1	10.0
4	0	0.0
5	2	20.0
6	1	10.0
7	2	20.0
8	0	0.0
9	0	0.0
10	0	0.0
Don't Know	0	0.0
Total	10	100

17. Does your company offer any energy efficient equipment?

Response	Frequency of Response	
	N	%
Yes	8	80.0
No	2	20.0
Total	10	100

Q17
Preparation tables, remote refrigeration units
No
Yes - insulated panels for refrigerated cases
Yes
Yes
Yes - Their equipment is "the most efficient in the business"
Yes - preparation tables. There are new requirements that condiments must be kept cold. The regulation created confusion, but Beverage-Air developed a table that met the requirement far more efficiently than other companies.
Not really
Yes. They are in the process of testing equipment, to comply with California energy requirements. Every time they manufacture something they look at efficiency, and they are willing to spend more money on efficient compressors.
Yes - ice machines

17a. Do you market it differently than your other equipment? 17b. If yes, how?

Q17A
No
No - this is the only product they manufacture - certified as an Energy Star product
No
No (there is no equivalent to a SEER or EER rating, so there is no way for them to back up efficiency claims)
No, all of their equipment is specifically designed to be the most efficient available, so they market it all the same.
They haven't in the past, but now they will - particularly on these food prep tables. They will send people copies of the article from Food Equipment Reports indicating that their product was tested by the FSTC and found to be the most efficient. On reflection, he realized that even before this recent article, they did market the thickness of the insulation in their products, and the associated energy savings.
No, all of their equipment is marketed the same way.
They do market the ice machines differently from their other equipment (which is generally not as efficient), but the different strategy does not have to do with efficiency, it is simply a different product line. The ice machines are all marketed on a direct basis, straight to end users.

Now I have a few general questions.

18. Pacific Gas & Electric operates the Food Service Technology Center in San Ramon California. The Center conducts food service research and testing of equipment including cooking, refrigeration, and ventilation equipment. It also conducts a variety of workshops, seminars and conferences on the results of its research and testing. Have you ever heard of PG&E's Food Service Technology Center?

    - ❑ Yes
    - ❑ No (GO TO 30)
    - ❑ DK (GO TO 30)

Response	Frequency of Response	
	N	%
Yes	7	70.0
No	3	30.0
Don't Know	0	0.0
Total	10	100

19. Where did you hear about the Center?

Q19
Food Equipment Reports. Was recently asked to participate in a study, but decided not to, as he felt that the results would be too vague (not company-specific) - he wanted to see the FSTC release reports which showed results by company
Internet
3 years ago or so, attended a seminar on refrigeration, was one of invited presenters
He was out on the west coast at the Western Restaurant Show
He heard about a company in SF working with them on testing some reach-in glass doors for refrigerator cases.
Food Equipment Reports asked if they wanted to participate in independent testing of prep tables. Results at first were not-company specific, but Beverage Air wrote a letter asking to be recognized, and a subsequent article identified them
They had an item (prep table) tested for Food Service Equipment Reports

20. How many times have you attended the Center? _____

Response	Frequency of Response	
	N	%
0	7	70.0
1	3	30.0
Total	10	100

21. How many times have you received information from the Center? _____

Response	Frequency of Response	
	N	%
0	8	80.0
1	1	10.0
Other	1	10.0
Total	10	100

22. What is your primary connection with the Center?

Q22
None
They are starting to market their product over the Internet, and they have seen the website many times
None at this time, but received information a few times right after the presentation at the Center
None
None
Testing
None at this point

IF VENTILATION OR REFRIGERATION MANUFACTURER, GO TO QUESTION 30

Questions 23 through 29 deleted for the responses information since never asked.

23. When attempting to sell your product, what features do you promote most? (Can choose more than one answer)

❑ UL Listing ❑ Options available ❑ Efficiency
❑ Looks ❑ Reliability ❑ Price
❑ Other:____

Response	Frequency of Response	
	N	%
UL Listing	0	0.0
Options Available	0	0.0
Efficiency	3	16.67
Looks	2	11.11
Reliability	2	11.11
Price	2	11.11
Other	9	50.0
Total	18	100

Other Responses:

Q30A
Health standards, higher energy efficiency compared to other brands (based on surveys from SCE)
Exceptional service
Total operation costs (including energy costs) However, people that purchase aren't the people that see the benefits, so energy is not typically a large part of the conversation
Durability
Insulation value, long term durability based on workmanship
Low cost operation until replacement, durability, several aspects efficiency (quality of engineering staff, thickness of insulation, hp of motors)
Capacity and durability
Heavy gauge shelves, durability
Durability

24. What percent of the time does your rep or the dealer or designer which carries your product recommend equipment which saves energy to your customer?

_____________________ ❑ DK

Response	Frequency of Response	
	N	%
>=75%	0	0.0
>=50% to 75%	1	10.0
>=25% to 50%	1	10.0
<25%	2	20.0
Don’t Know or NA	6	60.0
Total	10	100

Q31
10-20%
Don't know
Don't know
25% (primarily in specification. If the spec is already written, those features will not generally be recommended.)
0%
50%
Don't know must be a lot in the Bay area with rebates, not so much in areas without rebates
Don’t know
Don't know
Don't know

25. Over the last few years, has this percentage decreased, increased, or remained about the same?

- ❑ Decreased
- ❑ Increased
- ❑ Remained the Same
- ❑ DK

Response	Frequency of Response	
	N	%
Decreased	1	10.0
Increased	1	10.0
Remained the Same	3	30.0
Don't Know	5	50.0
Total	10	100

26. What percent of your customers request equipment that saves energy?

____________________ ❑ DK

Response	Frequency of Response	
	N	%
>=75%	0	0.0
>=50% to 75%	1	10.0
>=25% to 50%	0	0.0
<25%	7	70.0
Don't Know or NA	2	20.0
Total	10	100

Q33
1% or less
Very seldom
Don't know
5%
0%
50%
10% unless there is a rebate
10-15%
0% - If someone comes up with an extremely efficient system, it'll get attention. However, the equipment they manufacture only has fractional hp motors (usually about 1/8 hp), so energy use is not huge.
Don't know

27. Over the last few years, has this percentage decreased, increased, or remained about the same?

- ❑ Decreased
- ❑ Increased
- ❑ Remained the Same
- ❑ DK

Response	Frequency of Response	
	N	%
Decreased	2	20.0
Increased	1	10.0
Remained the Same	6	60.0
Don't Know	1	10.0
Total	10	100

28. What percent of the equipment you manufacturer in a given year would you consider to be energy efficient?

__________ ❑ DK

Response	Frequency of Response	
	N	%
>=75%	6	60.0
>=50% to 75%	0	0.0
>=25% to 50%	2	20.0
<25%	2	20.0
Don't Know or NA	0	0.0
Total	10	100

Q35
90%
0%
100%
They consider all of their equipment to be energy efficient. However, he guesses that 25% of their equipment has additional features which increase the efficiency beyond their standard product.
<5% (they don't actually manufacture the mechanical part, so he answered this question in terms of the equipment they sell)
100%
100%
40%
80%
100% of their ice machines, 75% of other equipment

29. On a scale of 1 to 10, with 1 being very low priority, where do you think your customers rate energy efficiency in their decisions to purchase equipment?

Response	Frequency of Response	
	N	%
1	0	0.0
2	1	10.0
3	4	40.0
4	3	30.0
5	1	10.0
6	0	0.0
7	0	0.0
8	1	10.0
9	0	0.0
10	0	0.0
Don't Know	0	0.0
Total	10	100

30. What are you customers priorities when purchasing your equipment?

Q37
Price and performance
A solid, stable product that will last for a long time. Buildings are built around walk in coolers, so people do not want to have to tear the cooler our during the building's life and re-build it.
Cheap! There is also a company called Ahold in the Netherlands, buying grocery chains in the Northeast. They are dictating to the newly purchased stores that they use inefficient wood frame coolers, as that is the standard in the Netherlands. This is an example of another factor that influences customer purchase decisions
Price
Cost and longevity
Price is a much bigger issue than anything else. Price came up several times in responses to earlier questions.
Fast response, and price are key. Ruggedness and durability are also important. As long as economy is doing well, this will not change.
Expense
Dependability, value, cost, availability
Durability

31. What kinds of changes do you think would be necessary in your market to make energy efficiency a high priority when a customer thinks about buying equipment?

Q38
Rebates drove a lot of purchase decisions in the past. Money from Edison reduced the payback to a point where customers were interested
If he were better able to communicate the financial benefits of purchasing energy efficient equipment to his customers, he thinks that would make a difference
He believes it will happen in the next 5 years because of recent announcements about cuts in oil production. He felt that this will drive energy prices up
An energy shortage, or anything else which causes energy prices to rise. They have experienced a surge in interest in efficiency before, when prices were high
Manufacturers would need to begin educate the specifiers and designers about the benefits of energy efficiency. It would also help to have the ability to do analysis on different products. He'd like to have something like a SEER rating that can be used to compare different products in terms of energy efficiency. In particular, he was talking about the efficiency of the construction of the system, as opposed to the mechanical parts, since that is really more where his company is involved.
Cost of energy - has to be much more significant than it is for customers to worry about it very much.
An increase in the price of electricity, possibly effected by changes in world energy markets (OPEC). Also, the economy in general is doing well, people are spending a lot eating out, so restaurants don't have to think about energy. If the market started to foresee changes, they might start paying more attention to efficiency.
More specific quantitative comparisons between equipment, possibly with ways for customers to view how much energy is being consumed by the equipment in real time.
He believes that customers will never care about energy, all they care about is food. He also believes that equipment efficiency should only be improved in response to end user requests. Given these two statements, he felt that equipment would not become more efficient based on market sources alone. As such, he suggested that a universal requirement for efficiency would get manufacturers to manufacture to a level of efficiency. However, last thing he needs is another government agency. Let free enterprise determine what is important. If it is important to end users, let them start asking for it.
Not sure

Comments
For priority of energy efficiency - Depends on how big, bigger customers aren't as interested in efficiency, smaller companies are. Bigger companies are still only around a 5.
While he has not been to FSTC, his predecessor, VP Sales and Marketing was out there for the testing - - all information about the center came through the magazine - dealers may be getting info though.
Reason for decrease in customer request - the now seem to assume that all equipment is efficient

That completes this survey. On behalf of PG&E, I thank you for your time.

Finish Time __________

Company Name ________________________ Phone #: ___________

Contact Name __________________________ Time Start___________

Good (morning/afternoon). My name is ____________________. I am calling on behalf of Pacific Gas and Electric Company. We are conducting a survey about how the food service sector looks at energy efficiency. The results of the study are to be reported to the California Public Utilities Commission. The survey will take approximately 15 to 20 minutes. Your responses will be kept confidential.

May I proceed?

1. Does your company manufacturer equipment used by the food service market?

   ❑ Yes

   ❑ No (Thank and Terminate)

Response	Frequency of Response	
	N	%
Yes	10	100
No	0	0

A good portion of the interview questions request quantifiable responses, however I would like you to feel free to expand on you answers as you see appropriate. What we are trying to understand is how the market for energy efficient kitchen equipment works, or doesn't work.

2. What is your title?

   ❑ Sales Rep. ❑ Engineer ❑ Manager

   ❑ President ❑ Other: ____________________

Response	Frequency of Response	
	N	%
Sales Rep	1	10.0
Engineer	0	0.0
Manager	0	0.0
President	2	20.0
Other	7	70.0
Total	10	100

Other Responses:

Q2A
Marketing manager
Sales Manager
VP
Sales manager for food service products (also do HVAC)
Internal and International Sales Manager
VP Marketing
Sr. Product Designer

3. What are your primary responsibilities? ____

Q3
Marketing
Sales
Marketing, company management
Sales and marketing
Run the company, set up strategies, plan for future, make decisions about new products
Sales and marketing
Sales and marketing
Marketing strategies, all code compliance issues, and testing
Design Products, work with sales force
Managing sales in Southern CA

4. Our records indicate that you manufacture ventilation equipment. If this true?

- ❑ Yes
- ❑ No (Specify why: ____)

Response	Frequency of Response	
	N	%
Yes	10	100.0
No	0	0.0
Total	10	100

5. Are there any other types of equipment that you manufacturer for this sector?
   - ❑ Cooking
   - ❑ Refrigeration
   - ❑ Ventilation
   - ❑ No other types
   - ❑ Other: ____

Response	Frequency of Response	
	N	%
Cooking	0	0.0
Refrigeration	1	10.0
Ventilation	0	0.0
No Other Types	7	70.0
Other	2	20.0
Total	10	100

Other Responses:

Q5A
Utility distribution systems (electric and gas hookups)
But they do manufacture items related to hoods, such as fire protection equipment, exhaust
Conveyor systems, utility distribution systems

6. Would you please describe how you market your equipment?

Q6
National advertising, training programs for sales reps, go to exhibits and shows, contacting dealers, point of purchase displays
Have reps around country (independent), and these reps are responsible for marketing the product to dealers.
They market through reps who call on designers and dealers. They sell exclusively through dealers, except for national accounts (<5% of their sales). They market equipment as energy efficient, as air is one of the more expensive things that restaurant has to pay for. Their systems can save up to 30% over then standard hoods.
Primarily through representatives, almost never to customer.
They market exclusively to independent reps (food service reps). They market primarily to chains, but they also target Italian restaurants with wood burning pizza ovens.
They primarily to other manufacturers (particularly hood manufacturers).
The majority is marketed to chain accounts or dealers (in the case of smaller end users). Their advertising is mainly through printed literature and trade shows. They focus on efficiencies of system, and in the case of refrigeration equipment, on their ability to meet food safety regulations.
They primarily market through sales reps, in turn through kitchen consultants and contractors, but never with end users. However, he doesn’t define a chain, such as Burger King as an end user. They would market directly to Burger King (or other chains) but not to a franchisee.
They do some advertising in trade journals to get the word out, but they really work through consultants and dealers.
Sold through dealers and contractors. They do no marketing to end users.

7. What different ways does your product get to the end user?

Q7
Customers would be recommended their products either by consultants who are designing a kitchen, or a dealer acting in a design capacity.
Customers work with designers or dealers, but they can deal directly with manufacturer in areas where they do not have a representative.
End users work with a dealer (or with a designer who works with a dealer) to find the right product, and they buy the product directly from the dealer or designer.
Through distributors or contractors. They also sell to OEMs (hood manufacturers in this case) who then sell their product.
End users deal directly with their reps. Designers are involved in the process, but the customers typically deal directly with the reps, who then order the product from the manufacturer.
Customers go directly to hood manufacturers, as far as he knew
Customers who make specific requests for equipment with a lower exhaust rate would go to a dealer, who would recommend the companies product.
Customers go directly to dealers or kitchen designers
An end user would go to consultant or designer for assistance in designing a kitchen. The designer would send it out to dealers for bids, who would then get a hold of the manufacturer to complete the bid. Some end users may see equipment at a trade show and request equipment directly, but that is about the only way an end user would work directly with the manufacturer. This happens more often with their conveyor systems than it does with their hoods.
Customers contact kitchen contractors, or in some cases, contact dealers directly. Contractors or dealers in turn contact the sales representative.

8. Compared to other companies like yours, would you consider yourself to be small, medium or large in terms of revenue?

   ❑ Small   ❑ Medium   ❑ Large

Response	Frequency of Response	
	N	%
Small	4	40.0
Medium	4	40.0
Large	2	20.0
Total	10	100

We are particularly interested in understanding how decisions are made regarding the manufacturing of specific pieces of equipment. I am going to read a list of statements. Please indicate, on a scale of 1 to 10, whether you agree or disagree. A 1 means you strongly disagree and a 10 means you strongly agree.

9. The most important operational issue for our company is keeping our development costs for new equipment under control.

   ______________❑ DK

Response	Frequency of Response	
	N	%
1	0	0.0
2	2	20.0
3	1	10.0
4	1	10.0
5	4	40.0
6	0	0.0
7	0	0.0
8	1	10.0
9	0	0.0
10	1	10.0
Don’t Know	0	0.0
Total	10	100

10. Investing extra money in the manufacture of energy efficient equipment would reduce our ability to take advantage of other opportunities to invest in productions or sales efforts.

_____________ ❑ DK

Response	Frequency of Response	
	N	%
1	3	30.0
2	3	30.0
3	0	0.0
4	0	0.0
5	2	20.0
6	0	0.0
7	0	0.0
8	1	10.0
9	0	0.0
10	0	0.0
Don't Know	1	10.0
Total	10	100

11. I don't see any reason to be proactive about energy efficiency in today's economy.

_____________ ❑ DK

Response	Frequency of Response	
	N	%
1	3	30.0
2	3	30.0
3	1	10.0
4	1	10.0
5	2	20.0
6	0	0.0
7	0	0.0
8	0	0.0
9	0	0.0
10	0	0.0
Don't Know	0	0.0
Total	10	100

12. Determining if an energy efficient piece of equipment would be marketable requires too many resources.

______________❑ DK

Response	Frequency of Response	
	N	%
1	2	20.0
2	5	50.0
3	1	10.0
4	1	10.0
5	0	0.0
6	0	0.0
7	0	0.0
8	1	10.0
9	0	0.0
10	0	0.0
Don't Know	0	0.0
Total	10	100

13. The people who benefit most from energy efficient equipment seldom have influence in the purchase decision.

______________❑ DK

Response	Frequency of Response	
	N	%
1	0	0.0
2	1	10.0
3	1	10.0
4	0	0.0
5	0	0.0
6	1	10.0
7	1	10.0
8	2	20.0
9	0	0.0
10	2	20.0
Don't Know	2	20.0
Total	10	100

14. Energy efficient equipment is generally less reliable than standard equipment.

_____________❑ DK

Response	Frequency of Response	
	N	%
1	6	60.0
2	1	10.0
3	2	20.0
4	0	0.0
5	0	0.0
6	0	0.0
7	0	0.0
8	0	0.0
9	0	0.0
10	0	0.0
Don't Know	1	10.0
Total	10	100

15. I don't see how we can recover the extra cost of manufacturing energy efficient equipment by increased prices given today's low energy costs.

_____________❑ DK

Response	Frequency of Response	
	N	%
1	1	10.0
2	4	40.0
3	1	10.0
4	2	20.0
5	0	0.0
6	0	0.0
7	1	10.0
8	0	0.0
9	1	10.0
10	0	0.0
Don't Know	0	0.0
Total	10	100

16. It is difficult to find a market for energy efficient equipment.

______________❑ DK

Response	Frequency of Response	
	N	%
1	2	20.0
2	2	20.0
3	0	0.0
4	1	10.0
5	0	0.0
6	2	20.0
7	1	10.0
8	1	10.0
9	0	0.0
10	1	10.0
Don’t Know	0	0.0
Total	10	100

17. Does your company offer any energy efficient equipment?

Response	Frequency of Response	
	N	%
Yes	9	90.0
No	1	10.0
Total	10	100

Q17
Yes - air doors
Yes, their fans are mostly all one level of efficiency (which he considers to be high), but they do have super high efficiency motors that aren't stocked, but are readily available, and can be installed in their fans.
Yes, their primary product is energy efficient, but they will produce lower efficiency systems if customers request. Such requests are generally made to reduce the first cost of the system.
No, motors in their fans are all standard motors
Yes - ventilation equipment. All of their equipment is energy efficient - it is their specialty.
Yes, they supply energy efficient motors with many of their fans. The fans have already been redesigned to be more efficient. Although they still offer products with less efficient fans and motors, most of the fans they sell are of the higher efficiency variety, using the fans they specifically designed to be more efficient
Yes - they have done actual testing of their equipment to achieve lower exhaust rates. They also focus on decreasing the amount of conditioned air, without sacrificing comfort. They also have a unit which draws air out of dining room, which is also more efficient. They do have a range of efficiencies in their products.
They have one piece of equipment which is high efficiency, and they sell about three pieces of it each year, compared to thousands of sales of their standard efficiency product. However, "standard efficiency" in their market (i.e., for them and their 5 biggest competitors), is still fairly highly efficient.
Yes. They can build hoods to meet customer requests for higher efficiency by decreasing the flow of air required to meet codes and standards
All of their equipment is efficient, they specifically design their equipment to meet that need in the market. He also indicated that pre-designed like theirs costs less to operate than custom designed equipment.

17a. Do you market it differently than your other equipment? 17b. If yes, how?

Q17A
No - their product line is all similar in terms of efficiency
No, they typically install the higher efficiency motors only upon customer request. These requests often come from Canada, as the CFA (Canadian UL) has higher standards.
The low efficiency systems are typically not recommended, and are only sold if the customer requests it.
No - all their equipment is high efficiency, so they market it all as such.
No
Yes, they have specific point of sale literature for both the high efficiency and standard efficiency products. The literature for the high efficiency products focuses more on the efficiency of the system.
No
No, they really only provide energy efficient equipment upon request.
Since all their equipment is efficient, there is nothing to compare it to. However, he did say that he does market his equipment differently from other companies. His company focuses on efficiency, as opposed to other things, such as being local, or having the lowest purchase cost.

Now I have a few general questions.

18. Pacific Gas & Electric operates the Food Service Technology Center in San Ramon California. The Center conducts food service research and testing of equipment including cooking, refrigeration, and ventilation equipment. It also conducts a variety of workshops, seminars and conferences on the results of its research and testing. Have you ever heard of PG&E's Food Service Technology Center?

- ❑ Yes
- ❑ No (GO TO 30)
- ❑ DK (GO TO 30)

Response	Frequency of Response	
	N	%
Yes	5	50.0
No	5	50.0
Don't Know	0	0.0
Total	10	100

19. Where did you hear about the Center?

Q19
At a trade show in Las Vegas, presentation by Don. They are also involved in the McDonalds team project
It was in some trade publication last year - some sort of an article or advertisement about testing with McDonalds. McDonalds is one of their customers, and the article mentioned a competitor, so it caught his eye. He was very interested in learning more about the center.
At an ASHRAE show last February
Through various association contacts and meetings.
He heard about it internally when they supplied the equipment to the Center for the testing process

20. How many times have you attended the Center? _____

Response	Frequency of Response	
	N	%
0	4	80.0
1	1	20.0
Total	5	100

21. How many times have you received information from the Center? _____

Response	Frequency of Response	
	N	%
0	4	80.0
4	1	20.0
Total	5	100

22. What is your primary connection with the Center?

Q22
Good personal relationship, frequent exchange of information. They are not involved in testing of products at the FSTC, but would like to be in the future
None
Right now, it's only through ASHRAE meetings
None at this time
He has not visited the Center himself, but others from his company have - Provider of equipment used in the testing process

IF VENTILATION OR REFRIGERATION MANUFACTURER, GO TO QUESTION 30

Questions 23 through 29 deleted for the responses information since never asked.

30. When attempting to sell your product, what features do you promote most? (Can choose more than one answer)

❑ UL Listing ❑ Options available ❑ Efficiency
❑ Looks ❑ Reliability ❑ Price
❑ Other:________________________________

Response	Frequency of Response	
	N	%
UL Listing	0	0.0
Options Available	2	10.53
Efficiency	3	15.79
Looks	1	5.26
Reliability	1	5.26
Price	3	15.79
Other	9	47.37
Total	19	100

Other Responses:

Q30A
Performance
Longevity
Engineering, diversity for a variety of applications
Depends on who you go after, on chain accounts, then reliability, options, enhancements, become important
Durability, maintenance, simplicity numbers 2,3,and 4
Warranty, which indirectly relates to quality
Quality for the price
Engineering expertise, quality, service
Availability, quality

31. What percent of the time does your rep or the dealer or designer which carries your product recommend equipment which saves energy to your customer?

____________________ ❑ DK

Response	Frequency of Response	
	N	%
>=75%	1	10.0
>=50% to 75%	1	10.0
>=25% to 50%	0	0.0
<25%	4	40.0
Don't Know or NA	4	40.0
Total	10	100

Q31
Don't know
10% - It is a price-driven market - people that do buying are not paying energy bills. His company does a lot of chain work, so the construction division buys equipment, and the operations people who pay the energy bills aren't even in the picture.
10%
Don't know
50%
0% - He doesn't think that manufacturers would mention energy efficiency to their customers unless the customers asked specifically about it.
20%
Don't know
Don't know
100%

32. Over the last few years, has this percentage decreased, increased, or remained about the same?

- ❑ Decreased
- ❑ Increased
- ❑ Remained the Same
- ❑ DK

Response	Frequency of Response	
	N	%
Decreased	2	20.0
Increased	1	10.0
Remained the Same	3	30.0
Don't Know	4	40.0
Total	10	100

33. What percent of your customers request equipment that saves energy?

____________________ ❑ DK

Response	Frequency of Response	
	N	%
>=75%	0	0.0
>=50% to 75%	0	0.0
>=25% to 50%	1	10.0
<25%	5	50.0
Don't Know or NA	4	40.0
Total	10	100

Q33
Don't know - no direct contact with customers
10%
5%
Don't know
20%
0% - not heard of it happening
Chains probably ask for it as much as 70%, not so much in smaller companies (15% or so)
Don't know
Don't know
25%

34. Over the last few years, has this percentage decreased, increased, or remained about the same?

- ❑ Decreased
- ❑ Increased
- ❑ Remained the Same
- ❑ DK

Response	Frequency of Response	
	N	%
Decreased	2	20.0
Increased	1	10.0
Remained the Same	2	20.0
Don’t Know	5	50.0
Total	10	100

35. What percent of the equipment you manufacturer in a given year would you consider to be energy efficient?

__________ ❑ DK

Response	Frequency of Response	
	N	%
>=75%	3	30.0
>=50% to 75%	1	10.0
>=25% to 50%	2	20.0
<25%	4	40.0
Don't Know or NA	0	0.0
Total	10	100

Q35
100%
1% - Note that he considers all of his equipment to be better than standard, but they only put the high-efficiency motors in about 1% of their products.
50%
0%
100%
10%
30%
Very small, less than 1% - he noted that this is the same for the other large companies that make up most of the market for his product.
33%
100%

36. On a scale of 1 to 10, with 1 being very low priority, where do you think your customers rate energy efficiency in their decisions to purchase equipment?

Response	Frequency of Response	
	N	%
1	0	0.0
2	4	40.0
3	2	20.0
4	0	0.0
5	1	10.0
6	0	0.0
7	1	10.0
8	0	0.0
9	0	0.0
10	0	0.0
Don't Know	2	20.0
Total	10	100

37. What are you customers priorities when purchasing your equipment?

Q37
Price
Price. Their products are more expensive than the competition, so their customers come to them looking for other features like longevity, ease of maintenance, and functionality (i.e., doesn't leak grease on roof).
Price. This varies by customer, but ability to do job is important too. Also, if it's display cooking, appearance is important.
Price gets you in the game, then people start thinking about product features such as reliability
Cost of operation. Most of their customers come to them because they are looking for efficiency in the product, not because they are looking for the lowest first cost.
Price
Primarily cost, then quality, with efficiency third on the list.
Cost is #1, with operational quality (no breakdowns) and service close behind.
Cost is the main one, although some customers are also concerned with looks.
Price and availability are the two big ones

38. What kinds of changes do you think would be necessary in your market to make energy efficiency a high priority when a customer thinks about buying equipment?

Q38
Education to consumers about long term savings instead of short term costs
Increased energy costs
Smarter customers: thinking further down the line in costs
Education about the benefits of energy efficiency
An increase energy prices in the US would increase interest in energy efficiency. The global market is more interested in energy efficiency because energy is more expensive elsewhere. At trade shows in the US, the first thing customers ask is “how much does it cost to purchase” - in Europe, the first question is “how much does it cost to operate?” Purchase cost is still an issue elsewhere, but it is a smaller component of the purchase decision.
Some sort of an educational process to make users more aware of how high efficiency equipment can lower operating charges.
Probably a raised awareness of operation costs. Currently, most customers aren’t aware of the range of operating costs available in the equipment they buy.
Higher energy costs are the only way he can think of. For him personally energy efficiency is important, but customers are mainly concerned with having enough money to purchase the equipment they need to open their restaurant.
Probably some sort of financial incentive would make it worthwhile for customers to think about efficiency. A penalty for using over a certain amount of energy in your kitchen might also work.
The most obvious change would be an increase in the cost of energy. Another means is incentives. Southern California utilities have had incentive programs in the past, but they have not been marketed very well. He also suggested that such programs could be marketed to dealers and contractors instead of customers.

Comments
Don't know about the customer priority since they have no interactions with their customers
When rating EE (Q36) - It depends on markets - chain accounts are a bit higher (6) than mom & pop stores (3)
The company is relatively small in the US. However, their main facility is in Denmark, and their worldwide operations are relatively big. - he's a good friend of Don Fishers - have attended FSTC many times and received information quite often – increased recommendation of EE because their reps have gotten a lot better about selling the EE aspect of their product
Once - they did send some equipment to be tested, and he visited the center at that time. He also mentioned that their sister company has tested equipment there as well. And for receiving information - Several times, but only in regards to the equipment testing being done on their product. – Requests have Decreased as energy costs have gone down and also up as better-run companies have been increasing their interest in efficiency despite drops in energy costs.
He thinks it has slightly increased. However, he also feels that of the remaining 75% that don't ask for efficiency, many of them don't ask because they know that their companies products are efficient. That is to say, only 25% of his customers express an interest in efficiency, but he assumes that most of their customers are interested, even if they don't ask specifically about efficiency.

That completes this survey. On behalf of PG&E, I thank you for your time.

Finish Time __________

Appendix G
Final Market Characterization

Market Characterization for Pacific Gas & Electric Company's Food Service Technology Center

1. INTRODUCTION

This initial market characterization study was conducted at the beginning of Pacific Gas & Electric Company's (PG&E's) Food Service Technology Center (FSTC) Market Effects Study. The primary sources for the market characterization were: (1) interviews with selected FSTC Advisory Board members; (2) interviews with other food service industry experts identified by the FSTC; (3) interview with Mr. Carl Vail, who is the industry expert brought onto the evaluation team with the concurrence of PG&E; and (4) the market evaluation experience of the evaluation team. The purpose of the initial market characterization was to inform the data collection process.

This market characterization was updated as upon completion of the evaluation to reflect all data accumulated. The additional data includes end user surveys, designer interviews, manufacturer interviews, and FSTC Advisory Board review and focus group discussions.

It is important to state that the following market characterization focuses primarily on commercial sector eating and drinking establishments, to the exclusion of institutional (e.g., prisons, hospitals and schools) and military markets. This is because, as will be illustrated later in this document, commercial market eating and drinking establishments represent approximately 90% of the foodservice technology market. Similarly, the market characterization focuses on kitchen equipment and not on "standard" commercial equipment such as lights, insulation, windows, and HVAC. This is because these "standard" types of equipment are promoted by wider commercial energy-efficiency programs and are not unique to the foodservice market.

2. DEFINITION OF MARKET

The definition of market characterization used in this study is drawn from the California Board for Energy Efficiency (CBEE) Policy Guidelines dated February 4, 1998; specifically, the subsection titled Guidelines for Market Assessment. This subsection of the CBEE Policy Guidelines covers a mixture of elements that should be conducted by the utility when planning a program (e.g., cost-effectiveness tests) and elements that define or characterize the market. Specifically, we have extracted the elements that pertain to an *ex post* market characterization of an existing program. Thus, the market characterization should include the following elements:

1. A clear definition of the market or markets to be discussed, and a description of the scope and natural boundaries implicit in this definition.
2. A description of the structure of the market, including the following features:
    a. A summary of the specific technologies, services, or products being exchanged.

b. A summary of the major market participants and the nature of the transactions and other interactions between them, including buyers, sellers and intermediaries.

c. A description of the distribution chain - i.e., the variety of paths that a product follows on its way from a manufacturer to an end-user.

d. A description of the geographic boundaries of the market.

e. A description of circumstances and settings under which transactions tend to occur, including sales practices and market events that tend to result in transactions within the market (e.g., a decision to remodel precipitating the purchase of a new C&I lighting system).

f. Approximate estimates of the number of buyers, sellers and intermediaries in the market, as well as an order-of-magnitude estimate of the total annual sales of relevant measures and services.

g. An analysis of efficient market share, or the percentage of measures or services sold, that meet appropriate energy-efficiency criteria.

4. A thorough description of the market barriers impeding the adoption of cost-effective energy-efficiency measures and services within the market, if any.

3. MARKET CHARACTERIZATION

The remainder of this document is divided into sections addressing the primary characteristics contained in this definition.

3.1 Geographic Boundaries

The geographic boundary of the market being studied is the border of the State of California. The State of California became the market at the beginning of 1998 when the CBEE assumed sponsorship of the DSM programs previously designed and implemented by PG&E. Prior to January 1, 1998, the FSTC Program was primarily designed to benefit the customers within the PG&E service territory.

However, defining the geographic boundaries for the FSTC Program is a complicated issue for several reasons. First, the FSTC Advisory Board encouraged the development of co-funding and broadened the FSTC focus to a national level during the first meeting in 1986[1]. During 1988, the FSTC began participating in the American Society of Testing and Materials (ATSM) process to gain approval for test procedures. The first significant co-funding occurred in 1987 when the National Restaurant Association (NRA), the Gas Research Institute (GRI), and the Electric Power Research Institute (EPRI) became co-funders. Co-funding by national organizations and focus on the national standards process means that the FSTC is potentially having market effects at the national and even

[1] Appendix A, Literature Review, Bibliography, Item 51.

international level, despite the primary market being California consumers. The national/international effects of the FSTC are further enhanced by the fact that the chain operators are the primary initial audience for the FSTC work. This is because the chains benefit most from energy savings, and because they have the financial resources to study and implement improvements. Finally, the FSTC began, in 1991, the publication of *Kitchen Monitor*, a subscription service that focused on efficient foodservice equipment and targeted a national audience. While *Kitchen Monitor* ceased publication in 1994, a magazine, *Foodservice Equipment Reports*, with much of the same focus, began publication in late 1996. This magazine, with regular and significant FSTC input, currently has 33,000 subscribers throughout the U.S. and targets decision-makers in companies that spend $100,000 annually on kitchen equipment. In addition to these publications, the FSTC outreach effort has influenced the national and international market through the distribution of technical reports and availability of their web site.

Thus, while California businesses benefit, those outside California are also affected by the FSTC's efforts in the testing of manufacturers' equipment, the development of standard testing methods, national conferences and seminars, and the publication of *Foodservice Equipment Reports*.

3.2 *Market Segment Description*

The market segment being studied is the commercial kitchen efficiency market. This market segment can be viewed as having two elements: the food service facility efficiency element (i.e., building, lighting, insulation, window, and HVAC efficiency), and the kitchen equipment efficiency element (i.e., the cooking hood ventilation system, cooking equipment, and sanitation equipment efficiency). The FSTC program addresses both elements of the market.

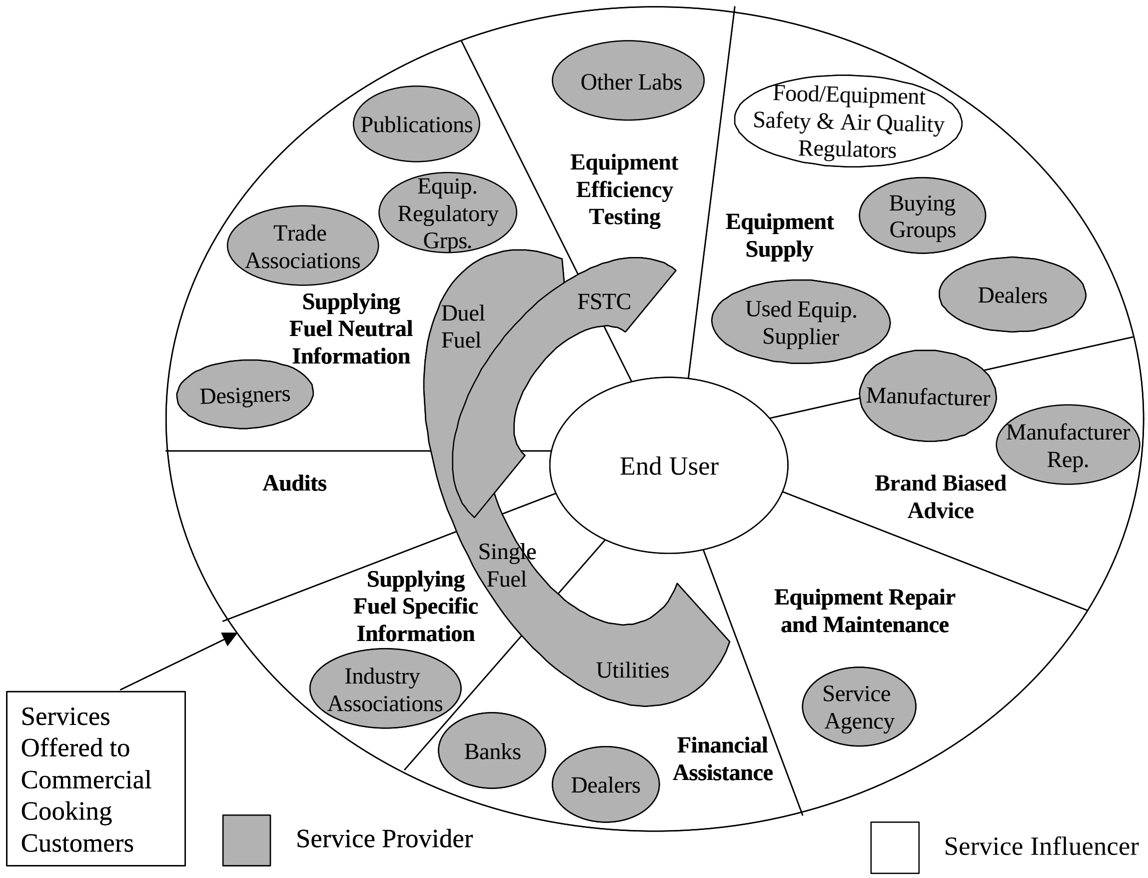
The food service facility efficiency element is addressed by energy-efficiency audits of commercial kitchens and by participation in advanced kitchen design projects such as the TEEM (The Energy Efficient McDonald's) Project.

The kitchen equipment efficiency element is addressed by the FSTC through its development of standardized test procedures, its participation in the ASTM and American Society of Heating, Refrigeration and Air-conditioning Engineers (ASHRAE) standards process, and its testing of commercial kitchen equipment for manufacturers and for publication.

For the purposes of this market characterization, we have divided the services provided within the commercial kitchen equipment efficiency market into eight primary services. These services are illustrated in Exhibit 1, along with the market actor offering the various services.

As illustrated by Exhibit 1, there are many service providers in the commercial kitchen market, with many of the service providers supplying services in several service sectors. As will be discussed later, not all end users have a need for, or access to, all of the services or service providers available in the industry. A short summary of each service sector, and the role played by each service provider, is presented below.

Exhibit 1
Services Offered to Commercial Kitchen Customers



Equipment Supply – Equipment is supplied to the end user by different market actors, depending on the size and need of the end user. The main equipment suppliers are used equipment suppliers, equipment dealers, buying groups, and manufacturers (often through their sales representatives). Used equipment dealers supply equipment mainly to small independent restaurants. Equipment dealers and buying groups serve as aggregators for small and medium-sized customers, while the large chains often deal directly with the manufacturers. Food Service and Air Quality Regulators are listed as an influencer in the equipment supply sector because, while they do not supply equipment to end users, they influence products supplied to end users by equipment suppliers.

Brand-Biased Advice – Manufacturers and their representatives supply advice and information to end users. However, this advice, by its source and purpose, is necessarily biased toward the interests of the manufacturer.

Supplying Fuel-Specific Information – Similar to the Brand-Biased Advice discussed above, the single-fuel utilities and fuel-specific industry associations (e.g., GRI and EPRI) supply end users with information designed to induce them to buy specific services. The information is usually biased toward applications that use their product.

Supplying Fuel-Neutral Information – Fuel-neutral information implies that no particular bias exists in favor of electric or gas equipment and that the information can be viewed by the user as objective. In general, this information is supplied by duel-fuel utilities, foodservice industry trade associations, designers who are not affiliated with any particular manufacturer, foodservice industry publications, and, to some degree, standards laboratories such as Underwriters Laboratories (UL) and others.

Equipment Repair and Maintenance – The users of foodservice equipment rely on an array of service and repair companies to maintain their equipment. These companies are generally independent (i.e., not direct affiliates of the equipment manufacturers) although large franchisees may have in-house equipment and repair capabilities.

Financial Assistance – When foodservice operators purchase equipment, they most often purchase it out of capital reserves. However, some portion of the industry (usually small to medium-sized businesses) will always seek financing to pay for the equipment. This financing most often comes from banks or through dealers that supply the equipment. At the same time, utility energy-efficiency rebate programs can assist customers in defraying the higher initial purchase price when energy-efficient equipment is involved.

Efficiency Audits – Energy-efficiency audits of foodservice facilities assist the operators by supplying energy-efficiency expertise. These audits can cover building efficiency (building, HVAC, and lighting) and foodservice equipment efficiency (cooking equipment, foodservice ventilation, and sanitation equipment efficiency). These services are generally only supplied by utilities.

Equipment-Efficiency Testing – Very few organizations conduct foodservice equipment efficiency testing. The primary developer of standardized test methods has been the FSTC, supplying *all* the standardized test methods currently supported by the ASTM. Some manufacturers are now using test methods developed by the FSTC to test and develop equipment. The Canadian Gas Research Institute (CGRI) and Arthur D. Little (ADL) also conduct limited equipment testing for their own use.

As can be seen in Exhibit 1, the FSTC spans three of the above services, supplying fuel-neutral information, auditing services, and equipment-efficiency testing. All indications are that the FSTC is unique in that it is the only fuel-neutral facility offering these services.

3.2.1 Technologies

The following discussion of technologies within the foodservice market sector focuses on the broad categories of equipment. Specific equipment is identified where relevant to the discussion; however, detailed discussion of the full range of individual equipment types is not feasible in this market characterization because of the sheer number of equipment types.

The foodservice efficiency market can be divided into three categories: building-efficiency measures, food preparation equipment efficiency measures, and sanitation equipment measures. The equipment types and/or measures included in each of these categories are discussed below.

3.2.1.1 Building Measures

The building measure category for the foodservice industry closely mimics the building efficiency measures that are applied in most other sectors. It includes shell thermal and infiltration performance, lighting use efficiency, and heating, ventilation, and air conditioning efficiency. With respect to building efficiency measures, the foodservice industry is unique in three primary ways: (1) the tremendous internal heat load represented by the cooking equipment; (2) the large amount of moisture generated in food processing, cooking, and sanitation tasks; and (3) the high air-change rates required for the kitchen hood exhausts. All of these create higher HVAC loads.

This having been said, most of the energy-efficiency measures applied in other sectors (anti-infiltration measures, high-efficiency windows, thermal insulation, high-efficiency HVAC, high-efficiency lighting), are still applicable to the foodservice market sector. Indeed, the long hours of operation and high energy loads make them even more effective in this sector.

3.2.1.2 Foodservice Equipment Measures

Foodservice equipment is the first thing most people think of when the foodservice market sector is discussed. The foodservice equipment category covers a wide range of products, including:

Cooking equipment, including:

  - Ranges
  - Griddles
  - Fryers
  - Broilers
  - Steamers
  - Ovens
  - Hot Food tables

- Kitchen ventilation equipment
- Refrigeration equipment, including:
  - Standing refrigerators
  - Walk-in refrigerators
  - Cold tables
  - Ice makers

Many of these technologies have a wide range of variations in equipment types and configurations. For example, griddles can be single-sided or double-sided and can have conveyors. Ovens can have steam, rotisserie, conveyor, and convection options, not to mention configurations large enough to walk into. Most technologies can be obtained in either gas or electric versions.

For ventilation systems and walk-in refrigerators, the equipment configuration is often custom fabricated for each particular situation.

3.2.1.3 Sanitation Equipment Measures

The sanitation equipment category primarily covers dishwashing equipment, hot water use in the kitchen, and hot water booster heaters. The booster heater is designed to increase the water supply temperature going to the dishwasher so that it meets the minimum temperature required for sanitation/safety. The dishwashing configurations include rinsing stations and dishwashers, with varying levels of automation. In most cases, the dishwasher configuration is custom designed to fit the space, the dishwashing load, and the configuration of the food service establishment.

3.3 Market Structure

The market structure for the foodservice market is extremely complex. As was discussed earlier, it involves many market actors at each market level. In addition, interactions between market actors vary by customer size [2]. As a result, the following discussion is divided first into a description of market actors by their position in the supply stream (up-stream, mid-stream, and down-stream), and a second description of the interactions of various market actors by customer size.

3.3.1 Market Actors

3.3.1.1 Up-stream Market Actors

The up-stream market actors in the foodservice market include equipment manufacturers, foodservice safety regulators, and equipment safety testing organizations.

Equipment Manufacturers. The foodservice manufacturers group consists of many, primarily small, manufacturers. As an indicator of the number of manufacturers, there were approximately 750 exhibitors at the 1997 North American Association of Foodservice Equipment Manufacturers (NAFEM) Association Exhibition[3]. NAFEM represents approximately 700 companies throughout the United States, Canada and Mexico that manufacture commercial foodservice equipment and supplies. NAFEM members account for 85% of all foodservice equipment and supplies sold in the United States. In addition the 25th Edition of the Foodservice Gas Equipment Catalog[4] listed 148 manufacturers of gas cooking equipment. The interviewees indicated that there are few national brands. They estimate that there are only two large manufacturers. Most manufacturers have annual revenues of less than $25 million. The typical foodservice equipment company is estimated to have annual revenues of approximately $5 million. The current trend in the industry appears to be toward consolidation into larger entities[5].

One of the effects of this broad base of small manufacturers is that no individual company has the resources or market power to significantly affect the market nationally.

---

[2] Appendix B, Market Actor Interview Responses, Questions 16 through 19.

[3] Appendix A, Literature Review, Bibliography, Item 40.

[4] Appendix A, Literature Review, Bibliography, Item 42.

[5] Appendix B, Market Actor Interview Responses, Question 8.

Food Safety Regulators. The food safety regulation process continually impinges on the manufacturers by requiring that equipment have the ability to hold food at, above, or below specific temperatures. Additionally, equipment must be designed so that it can be cleaned completely. As new food safety issues arise, manufacturers are subject to further requirements.

While health and safety regulators and inspectors play an important role in the day-to-day operation and sanitation of the foodservice facility, these interactions have little affect on the design and purchase of equipment by the end users. The end user will certainly purchase equipment that meet food safety regulation standards, but these standards are a result of the interactions between the manufacturers and the up-stream food safety regulators.

Equipment Safety Testing Organizations. The primary equipment safety testing organizations are the Underwriters Laboratory (UL), the American Gas Association (AGA), the Canadian Gas Association (CGA), and the Nation Sanitation Foundation (NSF). Virtually all commercial foodservice equipment manufacturers seek approval from one or more of these bodies because their customers require it. This is illustrated by a review of the Electric Foodservice Equipment Fact Book and the 25th Edition of the Foodservice Gas Equipment Catalog[6] where certifications are replete.

While this group of up-stream market actors could, in the future, include efficiency standards bodies (such as the ASTM and an industry-wide standards organization) no such participation currently exists. The fact that standards bodies do not currently operate as up-stream market actors is possibly due in part to manufacturers' resistance to equipment being subjected to further performance criteria.

3.3.1.2 Mid-stream Market Actors

The mid-stream market actors consist of the manufacturers' representatives, new equipment dealers, used equipment dealers, buying groups, designers, trade associations, foodservice publications, and the electric and gas utility foodservice laboratories. For purposes of market structure/market actor discussion, we divide these mid-stream market actors into two groups: Equipment Purveyors and Information Transfer Agents

Equipment Purveyors. The manufacturers' representatives, new equipment dealers, used equipment dealers, buying groups, and designers all act as intermediaries to sell equipment to end users. Their primary purpose is to supply information from manufacturer to end user for the purpose of getting them to buy equipment.

Information Transfer Agents. The trade associations, foodservice publications, and the electric and gas utility foodservice laboratories supply information to the market, interacting primarily with the Equipment Purveyors, but also, in some cases, interacting with manufacturers and large end users (as is the case with the FSTC). The primary function of this group is to supply information. In some cases, as with trade associations and single-fuel utilities, their objective is to influence mid-stream market actors and end users to use their product.

---

[6] Appendix A, Literature Review, Bibliography, Items 41 and 42.

3.3.1.3 Down-stream Market Actors

The down-stream market actors consist of (1) end users and (2) entities that service or regulate the end users. This third group is comprised of equipment repair and maintenance agencies, banks, air quality management districts (AQMDs), and utilities.

3.3.2 Market Actor Interaction

This section discusses the interactions of the market actors identified in Section 3.3.1. As discussed earlier, one of the primary data sources for this market characterization is interviews with a range of market actors[7] with modification based on other evaluation data collected. During the interviews, these market actors clearly stated that interactions in the market depend on the size of the end user[8]. As a result, this discussion of how the market interacts is divided into interactions for large, medium, and small end users. Exhibits 2 through 4 illustrate these cases. We have attempted to include all market actors in each diagram, despite the fact that they may have no interactions with that customer size. Additionally, we attempted to include all interactions. The dotted lines indicate weak or infrequent interactions/influence; the normal weight lines indicate moderate interaction or recognized open potential for interaction and influence; and the bold lines indicate primary modes of interaction or avenues of major influence for this customer size.[9]

To simplify overall discussion and to attempt to remove the "clutter" caused by all of the weak and typical interactions, we have combined all of the strong associations for all sizes of market actors in Exhibit 5. It may be helpful to refer to this exhibit while reading this section.

3.3.2.1 Interactions Common to All End Users

The interactions between up-stream market actors, between mid-stream market actors, and between up-stream and mid-stream market actors are common to all three sizes of end users. As a result, these will be discussed jointly.

Manufacturers/Equipment Purveyors/Distribution Chain. Manufacturers distribute information on their equipment and receive feedback from dealers and designers through the manufacturers' representatives. The purpose of this interaction is to sell equipment. Since these are their primary distribution channels, they create strong relationships. In the case of the intermediate-sized customers, they also interact with buying groups both to sell equipment, and to their chagrin, to negotiate prices.

Regulatory/Certifying Bodies. Food safety regulators and equipment certification bodies (such as the UL, NSF, and AGA) interact with manufacturers and each other to assure that the equipment being sold meets food and consumer safety standards. The appliance testing laboratories (such as the FSTC) also interact with the food safety regulators to understand how food safety regulations affect equipment performance. The primary

---

[7] Appendix B, Market Actor Interview Responses.

[8] Appendix B, Market Actor Interview Responses, Questions 16 through 19.

[9] Most of the interaction diagrams were developed using Appendix B, Market Actor Interview Responses, Questions 4 through 9 and 15 through 22, along with the evaluation teams' experience in the arena.

interaction occurs between manufacturers and food safety regulators to ensure public safety in the use of manufactured equipment.

In addition, most users in major metropolitan areas are regulated by AQMDs. Interactions with AQMDs are classified as “typical” or “normal” rather than as primary interactions.

Information Transfer Agents. All information transfer agents communicate either directly or indirectly with each other and with all of the top-level market actors. These interactions are shown as typical or normal because none of them are currently seen as having a primary influence on the sale of equipment. The two exceptions to this generalization are the interaction between the FSTC and the Testing Standards Groups (such as the ASTM) and the FSTC and the manufacturers. It is clear, since the FSTC has authored all current ASTM standard cooking equipment test procedures, that it has a primary interaction with the ASTM. The cooking manufacturer interviews illustrated that the FSTC is also exerting a major influence on cooking equipment manufacturers. While there are indicators of affects on other mid-stream market actors, the interviewees clearly indicated that these can not currently be considered strong interactions.[10]

Repair and Maintenance Agencies. All end users rely heavily on repair and maintenance organizations. Most of these companies operate either independently or as franchisees of manufacturers. As a result, they have typical or medium-level associations with dealers and manufacturers.

3.3.2.2 Large End Users

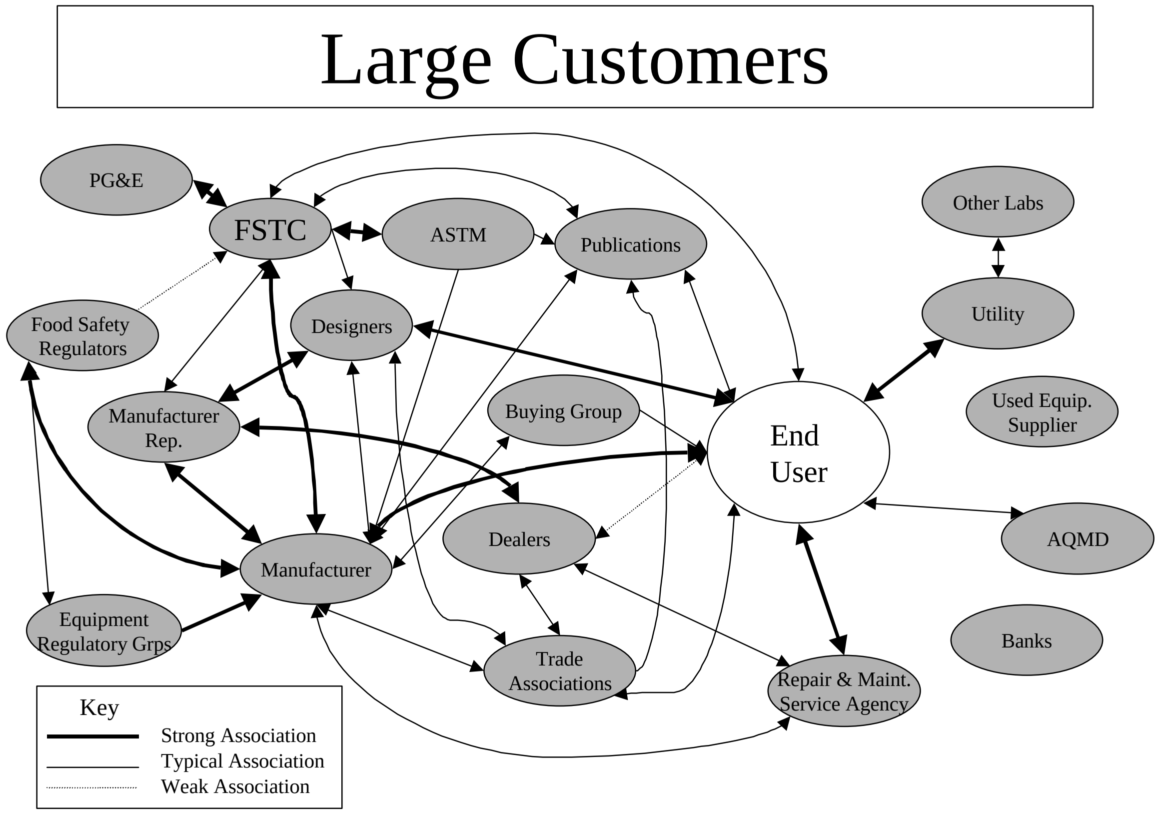
For the purposes of this discussion, large end users are defined as the national and international foodservice operators. Some classic examples are McDonald’s, Safeway, and Denny’s.

The overall interactions for large end users are illustrated in Exhibit 2 and are summarized with other size users in Exhibit 5. Large end users have strong purchasing associations with designers and manufacturers. Large end users have the resources to use designers (either independent or in-house) to design their kitchens and specify their equipment purchases. In many cases, especially with large chains, they also have the market power to go directly to the manufacturers to make special price deals and to obtain specially designed equipment. The lower end of the spectrum of large customers will also use dealers; thus, we have shown a weak association with dealers.

Large users have a lot of market power. While they get much of their information from equipment suppliers, they also rely on industry publications and trade association conventions/exhibitions and publications. Because large restaurants are so influential in the market, the FSTC has targeted them and developed direct relationships with some of them. These relationships have increased the FSTC’s credibility in the industry.

[10] Appendix B, Market Actor Interview Responses, Questions 1 through 7.

Exhibit 2
Flow Diagram of Market Interactions for Large End Users



In addition to common relationships with AQMDs and repair and service agencies, large end users generally have an ongoing relationship with local utilities. This relationship is usually bi-directional, with utilities desiring to serve their important customer base and end users wanting to optimize their rate structure.

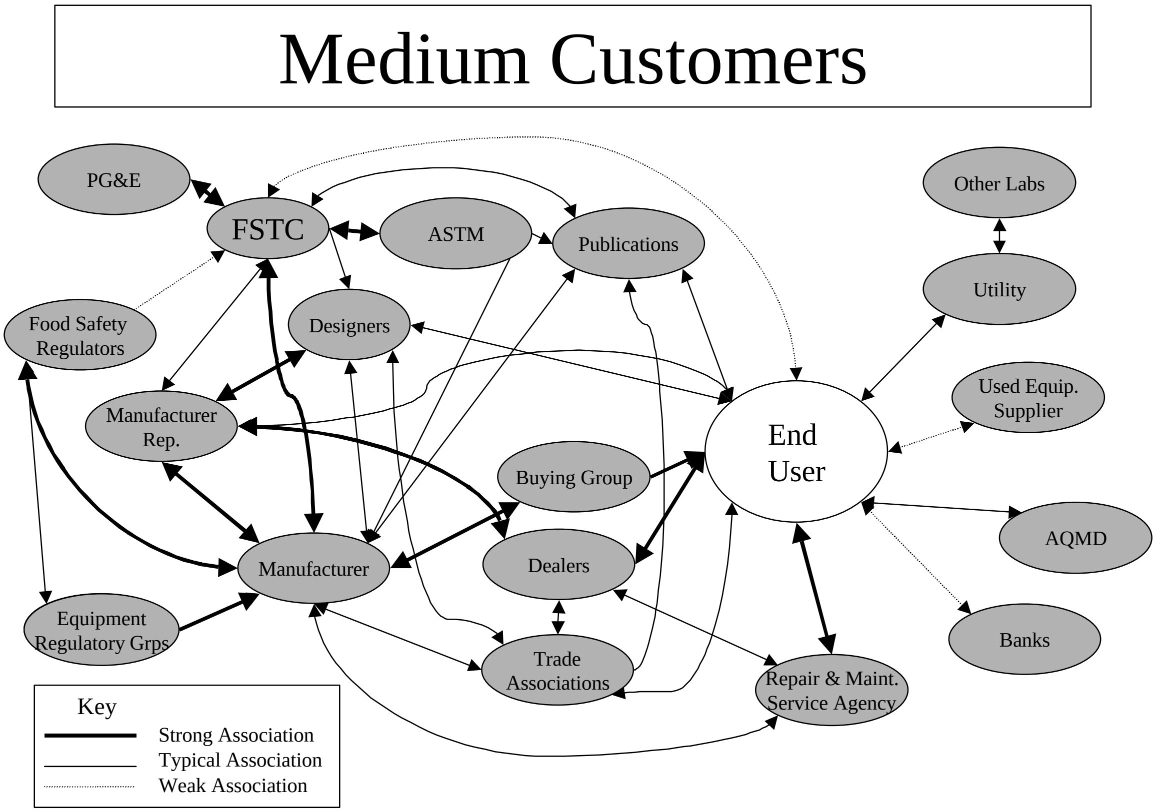
In general, large end users do not use banks to finance energy-efficiency projects. If they do install energy-efficient equipment, they fund them from operating budgets. These customers obviously have relationships with banks; however, we have not shown a relationship here because they do not use them for funding energy-efficiency efforts. Similarly, large end users do not install used equipment, except in cases where equipment is moved from one facility to another.

3.3.2.3 Medium-Sized End Users

For the purposes of this discussion, medium-sized end users are defined as the regional chain food service operators. Some classic examples are Chevy's, Andronico's, and High Tech Burrito.

Overall interactions for medium-sized end users are illustrated in Exhibit 3 and summarized with other size users in Exhibit 5. The strong purchasing associations for the medium-sized end users are with the dealers and through buying groups (sometimes called consolidators). Both of these market actors (dealers and buying groups) have the ability to compare equipment and supply competitive pricing. While the primary relationship is seen with these two market actors, designers and manufacturers' representatives are seen as additional sources of equipment and information for medium-sized users.

Exhibit 3
Flow Diagram of Market Interactions for Medium End Users



Like the large users, medium-sized users get their information from many different sources, much of it from equipment suppliers, but also from industry publications and trade association conventions/exhibitions and publications. The information they get from the FSTC is viewed as more limited and often obtained through publications.

Unlike the large users, some medium-sized users employ previously owned equipment while some use banks to finance energy-efficiency efforts. In both cases, this is due to the more limited resource base available to smaller operators.

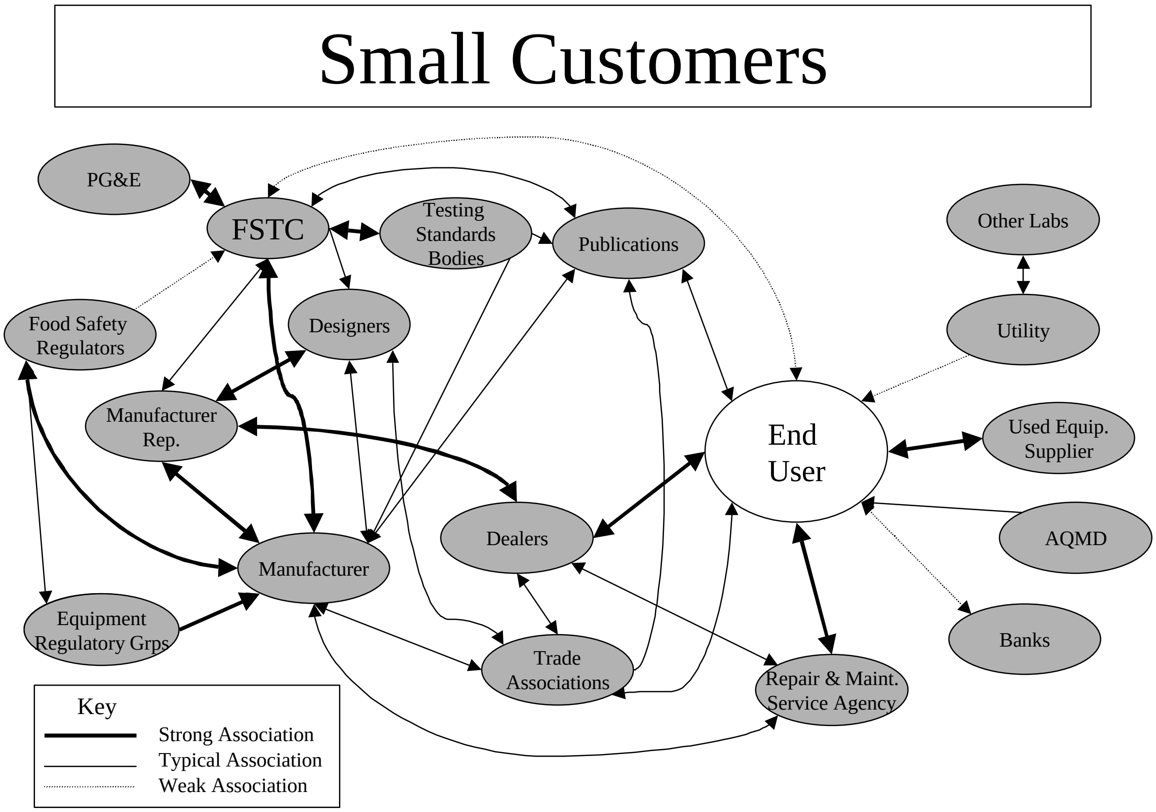
As with the large users, medium-sized users will have a relationship with the utility in an effort to ensure optimal rates. The utility may target this customer as a high priority for its service representatives.

3.3.2.4 Small End User

For the purposes of this discussion, small end users are defined as independent entrepreneurs and "mom and pop" operations. Almost by definition, these operators have limited financial resources and are either just starting out, or are trying to stay in business long enough to expand.

The overall interactions for small end users are illustrated in Exhibit 4 and are summarized with other size users in Exhibit 5.

Exhibit 4
Flow Diagram of Market Interactions for Small End Users



The strong equipment purchasing associations for small end users are with dealers and used equipment suppliers. Several interviewees felt that a very high percentage of equipment in the small business sector is previously owned[11]. These beliefs are supported by previous, related evaluations[12] and are consistent with the cash-short image of small foodservice businesses.

Small end users get their information from more limited sources and probably have a much more limited choice of equipment than the large and medium end users. They obtain their information from industry publications and trade associations, with a small amount (on average) of information coming directly from the FSTC. They probably do not have time to attend conventions/exhibitions.

Unlike medium users, small users show a weak association with financial institutions because, while they may need financial assistance, the failure rate of small foodservice businesses limits their access to this market actor.

[11] Appendix B, Market Actor Interview Responses, Question 25.

[12] Appendix A, Literature Review, Bibliography, Item 52.

The small user's contact with the utility is primarily to obtain what they need to operate their business. The utilities generally do not target the small customers for energy-efficiency efforts because it is such a diverse population and the return per contact is small.

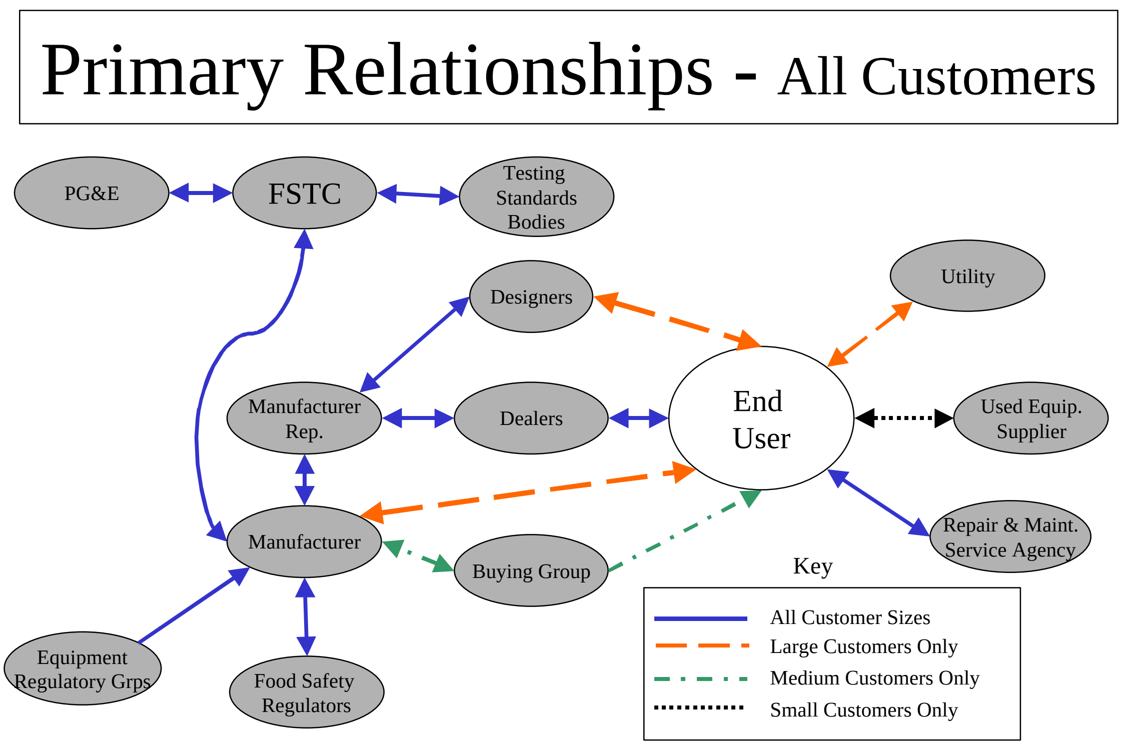
3.3.2.5 Overview of Important Associations for All Users

Exhibit 5 presents a summary of Exhibits 2 through 4 without the weak and typical associations. The key has been changed to identify the size of the end user.

The exhibit illustrates the overall supply chain for the foodservice industry. It shows that:

- The manufacturers distribute information through their manufacturers' representatives to dealers and designers,
- The large users obtain information and equipment directly from manufacturers and indirectly from designers,
- The medium-sized end users obtain information and equipment through dealers and buying groups,
- Small end users get information and equipment via new and used equipment dealers,
- The FSTC has a primary relationship with Test Standards Groups and the cooking equipment manufacturers, but does not currently have other primary route to disseminate that information or promote incorporation of standardized test method results into test specifications. That is, there is no industry-wide standards setting body to incorporate the ASTM test methods into industry accepted standards.

Exhibit 5
Combined Flow Diagram of Primary Market Interactions



3.4 Market Character

One of the most important facts that emerged from interviews with market actors is that energy efficiency is a very low priority for foodservice providers. Virtually all interviewees, in one form or other, pointed out that market forces dictated low priority for energy efficiency[13]. Some of the market forces that create this situation are:

- Energy costs represent 3% to 5% of operating costs for most food service providers[14]. On the other hand, labor and material costs are on the order of 30% each. It is not surprising that they look for savings in these categories.
- The primary objective for most entrepreneurs is growth. Keeping their capital costs down maximizes their return on investment, which attracts capital. As such, commercial kitchen equipment costs are kept as low as possible as part of the overall pressure to minimize capital spending.
- Cooking performance, reliability, durability and cost almost always come before energy efficiency in end users' selection criteria. As size of end user decreases, price rapidly becomes the most important purchase decision.[15]

Given that cooking performance, reliability, durability and price are key to the purchaser, manufacturers hesitate to introduce energy-efficiency features that negatively affect these equipment features. Several interviewees rationally explained why many advanced energy-efficiency innovations decrease reliability and durability while increasing initial purchase price and maintenance costs. An example was to compare the power burner to the atmospheric burner for most range applications. The atmospheric burner has been around for decades (in principle, for a century) and consists of a casting with holes in it and a simple control valve. The power burner, which supplies air under pressure to control the stoichiometry of combustion, requires a fan to supply the air, a mixing chamber, and controls. All of these have failure rates and cost more money, thus decreasing the durability and reliability while increasing the cost.[16] Given the priorities that end users put on purchase criteria as a result of the market forces listed above, it is not difficult to see why energy efficiency is a difficult sell in the foodservice market.

To counter this position, the utilities view the market as one of their ten most important. This is because the foodservice sector has the highest per square foot energy consumption of any market. In addition, technical specialists point out that some of the primary types of equipment in the market have a high potential for energy efficiency improvements (e.g., 20% to 50%).

[13] Appendix B, Market Actor Interview Responses, Questions 12 and 17 through 19.

[14] Appendix A, Literature Review, Bibliography, Items 15 and 32.

[15] Appendix B, Market Actor Interview Responses, Questions 17 through 19.

[16] The FSTC points out that for other technologies, they have tested equipment which serve the same function and would be expected to have about the same cost, yet show substantially different energy efficiency (3:1). So this argument does not necessarily hold true for all types of equipment.

3.5 Market Size

Indicators of the size of the foodservice market are summarized in Exhibit 6. As can be seen, in 1998 the total US foodservice market is estimated to be about $336 billion[17] with California representing about 8%.[18]. There are about 800,000 foodservice locations nationwide, with about 72,000 in the California market and about 57,000 of these being fast-food or sit-down restaurants[19]. One of the defining characteristics of the market is the large number of foodservice equipment manufacturers, with estimates of about 750 in the US[20]. Many of these manufacturers do not produce energy-consuming equipment. It is estimated from the 1997 National Foodservice Equipment Manufacturers Association Exhibition Guide that 200 to 250 of these manufacturers produce energy-consuming equipment. This high estimated number of manufacturers is supported by comments from the interviewees that describe the foodservice industry as "still a cottage industry" and point out that there are only two or three manufacturers with annual revenues in excess of $20 to $30 million. The typical equipment manufacturer is estimated to have annual revenues of less than $5 million. [21]

Exhibit 6
1998 Indicators of Market Size

	United States	California
Source	National Restaurant Association	California Restaurant Association
	Billions $	Billions $
Eating and Drinking Places		
Commercial		
Eating Places	226	18.2 *
Drinking	11	0.9 *
Managed Services	22	1.8 *
Hotel/Motel Restaurants	18	1.5 *
Other	28	2.3 *
Institutional	30	2.4 *
Military	1	0.1 *
Total Sales	336	27.1
Estimated Energy Costs (4%)	13	1.1
Number of Locations	799,000	71,600
Number of Employees	9,500,000	844,000
Number of Manufacturers	~225	Unknown
Estimated # Units Sold/Yr	>150,000	>12,000 *

* Prorated based on national values and CA total.

[17] 1998 National Restaurant Association Restaurant Industry Pocket Fact Book.

[18] Fast Facts – 1998 California Restaurant Association Restaurant Industry.

[19] NPD Recount Database of Restaurants in California.

[20] Appendix A, Literature Review, Bibliography, Item 40.

[21] Appendix B, Market Actor Interview Responses, Question 8.

The large number of small players has probably contributed to the large number of market actors, which in turn contributes to the extremely complex interactions discussed above. While manufacturer consolidation is said to be underway, it would take a 20-fold consolidation of manufacturers to start to change the picture significantly.

4. MARKET EVENTS

The primary market event of interest in the foodservice equipment arena is the sale/purchase of a unit of equipment. Updated Arthur D. Little estimates[22] indicate that there were in excess of 150,000 units of the high value equipment[23] sold in the US in 1998. Prorated, this represents about 12,000 units in California. These events are precipitated by construction of new restaurants, replacement of worn out equipment stock, and menu changes[24]. The ADL study indicates that approximately two thirds of these market events result from the replacement of closed restaurants (and presumably replacement of worn out stock), while one third represents actual increase in restaurant capacity.

5. MARKET BARRIERS

5.1 Identification of Market Barriers

The primary source for identifying market barriers is the response to the market actor survey conducted at the beginning of this evaluation. The market actor survey targeted a spectrum of market actors, including industry associations (i.e., groups promoting a specific point of view), consultants, end users, manufacturers, and trade associations (i.e., groups representing market actors such as manufacturers or restaurant owners). All market actors were interviewed by evaluation professionals using an interview guide. The guide (Appendix C) promoted the in-depth discussion on the workings of the market. Responses to questions are attached in Appendix C. Questions most relevant to discussion of market barriers are 12 through 15, which asked directly about barriers to energy-efficient equipment for four of the market actors (end users, manufacturers, manufacturers' representatives, and designer/specifiers). These responses were then reviewed by the evaluation team and categorized into the specific market barrier language developed by the Eto et. al. scoping study[25]. Exhibit 7 identifies market barriers identified through analysis of interview responses.

---

[22] Appendix A, Literature Review, Bibliography, Item 15.

[23] Floor fryers, convection ovens, griddles or grills, broilers, and combi oven/steamers.

[24] Appendix B, Market Actor Interview Responses, Question 24.

[25] A Scoping Study on Energy-Efficient Market Transformation by California Utility DSM Programs. Eto, J.; Prahl, R.; Schlegel, J. July 1996.

Exhibit 7
Market Actor Interview Responses

Market Barrier	Market Actor Affected		
	End-User	Mfgr.	Designer
Organizational Practices	√	❖	❖
Performance Uncertainty	√	√	
Asymmetric Information	√		
Information & Search Costs	√		❖
Access to Financing	❖		
Split/Misplaced Incentives	√		
Product Unavailability	❖		❖

√ = Most Important Barrier for End-Users ❖ = Lesser Market Barriers for End-Users

As Exhibit 7 illustrates, seven market barriers were identified as acting in the market. Access to financing was dropped as an evaluation barrier due to limitations on survey length. The remaining six barriers were addressed in the questionnaires. The following is a general description of how each market barrier is manifested in the food service market.

Organizational Practices. The organizational practices market barrier was seen by the respondents to be present for all market actors discussed. In end users, it manifests itself in separate decision-making when purchasing equipment. In general, only first cost is considered and long-term payback is not taken into account. This is because capital funds tend to be reserved for expansion where users believe there will be a greater return on investment. It is these relatively more attractive, competing investments that drive down the consideration of energy efficiency. In manufacturers, it is manifested in a slow change from traditional products and production techniques, along with a reluctance to spend money on retooling for new products. In manufacturers' representatives, it emerges because representatives are captive to the line of equipment the manufacturer produces. If their manufacturer does not have efficient equipment, they try to steer the customer away from energy efficiency. For the designer, the issue is that their customers are generally demanding lowest first-cost because of the value put on capital for expansion. As a result, they are generally responding to customer demand and find "selling" energy efficiency an uphill battle.

For all of the other market actors, this market barrier is closely connected to the high value they put on the present value of money. That is, as organizations, they tend to have somewhat high discount rates, i.e., they do not believe that future savings from efficient equipment offset the current value of the money.

Performance Uncertainty. Performance uncertainty was identified by all types of users except the designers. Designers are considered the best informed market actors because they are required by their trade to gather information on a spectrum of equipment in order to make intelligent recommendations to their customers.

Asymmetric Information. The asymmetric information market barrier arose only for the end users and arose when all parties were queried as to whether end users believe equipment performance claims (question 11). While the respondents confirmed a high degree of current skepticism, they gave credit to the ASTM test methods for bringing standardized information to the industry and pointed out that the ASTM standard test results have proven how bogus some prior claims were, thus increasing industry mistrust of claims.

Information and Search Costs. The information and search cost market barrier is primarily caused by a lack of awareness of the value of energy efficiency in the industry. This lack of awareness is tied to the low interest in energy efficiency in this sector arising from the fact that energy costs are such a low percentage of overall operating costs.

Access to Financing. Access to financing is only a market barrier for some medium and small users. This lack of access is tied to the high failure rate in the foodservice sector, a phenomenon well understood in the banking industry. However, because this applies to only a small portion of the market it is not considered a significant barrier.

Split Incentives. The split incentives market barrier, while only associated with the end user, is still considered to be a significant barrier because it appears to apply to all but the most integrated companies. The general practice in the industry seems to be that there is no connection between the operational decision-making process and new construction or purchasing decision-making processes. This market barrier is strongly associated with the high value placed on the present value of capital funds for growth. Because of this, all capital expenditures are viewed under the “lowest first cost” microscope, and the foodservice equipment costs simply fall within the overall category of capital costs.

Product Availability. The product availability market barriers plays a role for several market actors. For end users, equipment must be readily available in the size they need when they need it. If not, it is less likely it will be installed. Similarly, for larger chains it must be available nationwide. If not, it is unlikely to be adopted. For the manufacturers’ representatives, if it is not available in their product line, they will not promote it. Designers need to have a range of equipment to offer their customers. If they have only one efficient model, it becomes much harder to fit it into the designs and to sell the customer on its unique advantages. In general, “efficient products” based on standardized tests are only beginning to enter this market. All this having been said, product unavailability did not seem to be a major obstruction to energy efficiency in the market, in that other market barriers overshadowed it.

In order to collect the information needed and not annoy customers by requesting unreasonable interview lengths; the evaluation had to limit the assessment to five market barriers. Given the discussion above, the five market barriers chosen for study were organizational practices, performance uncertainty, asymmetric information, information and search costs, and split or misplaced incentives.

5.2 Critical Order of Market Barriers

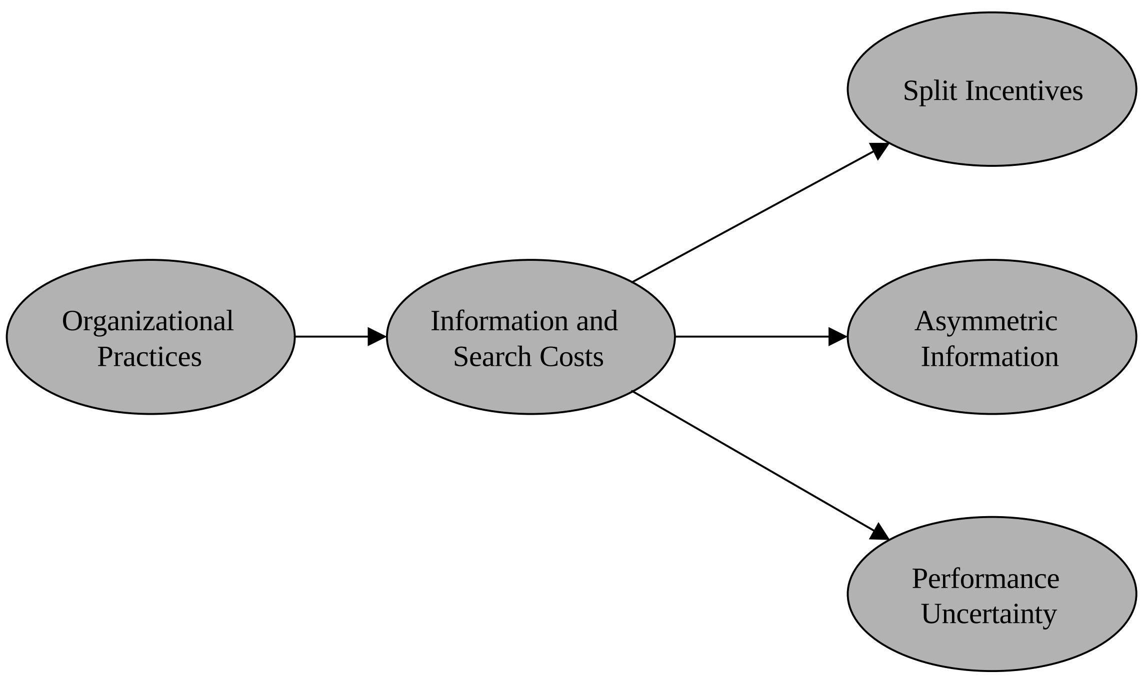
Given this market barrier discussion, the evaluation team hypothesized a critical structural component of the foodservice market sector. The hypothesis is that the organizational practices and informational search cost market barriers form a "barricade" that must be overcome prior to other market barriers becoming truly significant. During the market actor interviews, one interviewee stated that energy efficiency ". . . is not even on the map as far as purchase criteria are concerned". This quote tells a story hidden in the subtext of many of the other responses. When responding to the question about end user purchase criteria, most respondents indicated that energy efficiency was at the bottom of the list after cooking performance, reliability, first cost, and maintainability.

In order for the foodservice market to care about the remaining barriers, it must first overcome the organizational practices (high value on capital dollars and low value on operational savings) that inhibit interest. Secondly, it needs to reduce the information and search cost barriers. There is currently insufficient information available in the market on the value of energy efficiency because too few end users are asking for it, and an industry that puts a high value on capital dollars for expansion also tends to put a low value on research and development.

Exhibit 8 illustrates this hierarchy.

Data collected during the evaluation showed the organizational practices barrier to be present but smaller than other barriers. This could suggest that either this barrier has been reduced to the point where it is not currently an issue or that the hypothesized hierarchy is incorrect. The data does not clearly indicate which answer is correct.

Exhibit 8
Market Actor Interview Responses



6. SUMMARY

The foodservice equipment market is composed of a large number of market actors. Manufacturers generally disseminate information to dealers and buying groups through their sales representatives. Large end users employ kitchen designers and purchase their equipment through direct negotiations with manufacturers. Medium-sized end users generally purchase through dealers and buying groups, while the small end users purchase through dealers and used equipment suppliers. Purchasers generally find out about advances in the industry through trade magazines, trade associations, trade shows, and dealers.

The purchase of equipment is most commonly precipitated by new construction, equipment replacement, or menu change. In the purchase of equipment, purchasers consider the cooking performance of the equipment, the reliability and durability, national availability, and price before they consider energy efficiency. The smaller the customer, the more important price becomes. Energy efficiency is ranked very low among the decision criteria because energy consumption is estimated to represent only about 3% to 5% of the foodservice operators' operating costs. Combined with the capital-intensive nature of the foodservice industry, this low contribution to operating costs makes it difficult to bring energy efficiency to the forefront of the foodservice operators' agenda.

The primary market barriers in the foodservice industry are organizational practices, performance uncertainty, asymmetric information, information and search costs, and split incentives

Appendix H
Methodological Details

Appendix H
Methodological Details

1. Regression Diagnostics

Investigators who use ordinary least squares techniques can experience a number of problems that result in biased or inefficient estimates. There are various techniques for detecting and for correcting these types of problems. Listed below are the potential problems that were addressed as part of this analysis and the results.

1.1 Heteroskedasticity.

Heteroskedasticity refers to the situation where the variances around estimates are different for different levels or values of the predicted variable. This problem is common in cross-sectional analyses, but does not result in biased estimates; rather, it results in inefficient estimates. The first step taken to identify this problem was to plot the residuals against the predicted values of the dependent variable. This allows visual identification of situations where the differences between predicted values and observed values are larger at some points of the regression line than others. Most commonly, heteroskedasticity takes the form of larger variances for higher values of the predicted variable.

The process of correcting for heteroskedasticity is not predictable. The correction depends on the form of the relation between the predicted variable and the error. The researcher tries different corrections for different functional problems and evaluates the results to determine whether the correction is appropriate. Sometimes the problem can be corrected or reduced by adding variables to the model that will explain the additional variance.

In addition to visual inspection of residuals plotted against the predicted values, the more formal Breusch/Pagan test was performed (Johnson, Johnson, and Buse, 1987). The results of these tests indicated that heteroskedasticity was not a problem.

1.2 Outliers and Influential Observations.

The ordinary least squares method is very susceptible to the influence of cases that have extreme values. The bulk of the cases may be clustered in a rather tight area, with one case residing far away from the rest on the independent variable. This extreme case would have a very strong impact on the estimate of the regression coefficient, and would result in a biased estimate. Because of this influence on the prediction, such cases often cannot be detected by visual inspection or by observation of errors. This is because the prediction “line” may be close to the outlier *because* of its influence. This problem can be overcome by the DFFITS procedure which calculates a predicted value two ways, once with a potential influential observation and once without it. If there is a large difference between the two, the case is considered influential. DFFITS values for a given observation greater than a certain value were considered to be outliers. A convenient sample-size-adjusted cutoff was calculated as follows:

$$2\sqrt{p / n} \tag{1}$$

where

p = the number of variables
n = the number of observations

A second test also estimates the model with and without the observation and then the difference between the two coefficients reflects the degree of influence. This is the DFBETA difference. These methods were employed in the current analysis toward detecting and correcting for influential cases.

Using these tests a number of outliers were detected and eliminated from the models.

1.3 Multicollinearity.

Multicollinearity refers to the situation where two or more independent variables in a model are highly intercorrelated. This level of intercorrelation causes difficulties in the model. Specifically, multicollinearity results in higher variances for both predicted and explanatory variables. It also creates difficulty in partitioning variance among the competing explanatory variables. First, however, the problem must be detected. There are several ways to approach this task.

The simplest method to begin searching for multicollinearity is to compare the significance probabilities (p values) associated with the overall model compared to the p values for the partial coefficients for the explanatory variables. If there is a large discrepancy, multicollinearity should be suspected. In other words, if the overall model fits the data very well so that the p value is very small (e.g., 0.0001), but the p values for the individual coefficients are substantially larger, this indicates that variance cannot be partitioned into the various explanatory factors, and this implies strong linear relations among them.

Another approach to detecting multicollinearity is to test for variance inflation factors. A way to do this is to regress each explanatory variable on all other variables in the model. This allows the investigator to calculate a variance inflation factor by this equation:

$$\frac{1}{(1-R_i^2)} \tag{2}$$

where R_i^2 is the coefficient of determination for the regression of the ith independent variable on all other independent variables. This result is a measure of the instability of the coefficient estimate. Meyers (1990) indicates concern when values exceed 10.

Another approach to detection is recommended by Belsley et al (1980, chapter 3) and involves the analysis of structure. This approach entails the eigenvalues of the correlation matrix of the set of independent variables. The square root of the ratio of the largest to smallest eigenvalue is called the condition number which provides a single statistic for indicating the severity of multicollinearity.

Once detected, there is no consensus on what to do about it. Some recommend doing nothing. Others recommend obtaining more data, which, given both time and budget constraints, is often unfeasible. Omitting one of the variables implicated is perhaps the most common approach. However, this makes sense only if the true coefficient of the omitted variable is zero. If the true coefficient of that variable is not zero, however, a specification error is created. Yet another approach is to group the collinear variables together to form a composite index capable of representing the group of variables by itself.

The various approaches that we took were a function of the specific situations we encountered in the analysis. In general, we found no multicollinearity, with one exception. In all of the regression models involving participants and end users, we introduced the Mills ratio (see Section 4.3.3.3 for details). However, when entered into the regression model, the eigenvalue associated with the Mills ratio was well above 30, reduced the significance of key variables, and changed the signs of key variables, all classic signs of multicollinearity. Thus, this variable was dropped from the model, which meant that we were not able to control for any unobserved differences between the participants and the end users. We were forced to rely on statistical controls using the observed differences.

1.4 Serial Correlation

Data can sometimes manifest a problem referred to as serial correlation. Such a condition does not create biased coefficients but does cause the variances around the estimates to be larger than they should be, i.e., the estimates are not the most efficient. This problem affects hypotheses testing. However, an examination of the Durbin-Watson statistic indicated that serial correlation was not a problem.

1.5 Results of Regression Analysis

In the Exhibits that follow, the detailed results of the various regression analyses are presented. It is important to note that in these models the variable Group is code as a “1” for end users and a “2” for participants.

1.5.1 Attitudes Toward Energy Conservation

Exhibit 1.1 displays the detailed results of the regression analysis for attitude toward energy conservation.

Exhibit 1.1
Regression Results for Attitudes Toward Energy Conservation

Variable	Coefficient	T Value	P > t
Intercept	8.67	16.76	.0001
Group	-.71	-1.70	.09
Number of Employees	.002	.24	.81
Number of CA Sites	.0002	.06	.96
Size of Facility	-.17	-.68	.50
Adjusted R^2 =.01	**N** =128		

1.5.2 Market Barriers

Exhibit 1.2 through Exhibit 1.6 display the detailed results of the regression analysis for the five market barriers.

Exhibit 1.2
Regression Results for Performance Uncertainty

Variable	Coefficient	T Value	P > t
Intercept	9.11	20.0	.0001
Group	-1.47	-3.99	.0001
Number of Employees	-.007	-1.17	.24
Number of CA Sites	-.001	-.52	.60
Size of Facility	-.36	-1.57	.12
Adjusted R^2 = 128	**N** = 128		

Exhibit 1.3
Regression Results for Information Search Costs

Variable	Coefficient	T Value	P > t
Intercept	5.08	8.33	.0001
Group	.90	1.81	.07
Number of Employees	-.01	-1.29	.20
Number of CA Sites	-.004	-1.16	.24
Size of Facility	-.35	-1.14	.26
R^2 = .02	**N** =128		

Exhibit 1.4
Regression Results for Asymmetric Information

Variable	Coefficient	T Value	P > t
Intercept	7.49	12.87	.0001
Group	-1.09	-2.31	.02
Number of Employees	-.01	-1.37	.17
Number of CA Sites	.002	.48	.63
Size of Facility	.11	.36	.72
$\mathbf{R^2}$ = .05	**N** = 128		

Exhibit 1.5
Regression Results for Organizational Practices

Variable	Coefficient	T Value	P > t
Intercept	8.44	17.29	.0001
Group	-1.67	-4.22	.0001
Number of Employees	-.004	-.64	.52
Number of CA Sites	.0004	.14	.89
Size of Facility	-.35	-1.44	.15
$\mathbf{R^2}$ = .21	**N** = 128		

Exhibit 1.6
Regression Results for Split Incentives

Variable	Coefficient	T Value	P > t
Intercept	5.53	7.06	.0001
Group	-.82	-1.30	.20
Number of Employees	-.001	-.13	.89
Number of CA Sites	.01	2.09	.04
Size of Facility	-.20	-.50	.62
$\mathbf{R^2}$ = .02	**N** = 128		

1.5.3 Requests for Information Regarding Equipment Which Saves Energy

Below are presented the results of the regression analyses examining the extent to which participants and end users asked the dealers, manufacturers, sales representatives, or designers about equipment that saves energy.

Exhibit 1.7
Regression Results for Asking About Cooking Equipment Which Saves Energy

Variable	Coefficient	T Value	P > t
Intercept	-8.26	-2.96	.004
Group	6.72	2.93	.004
Number of Employees	-.07	-1.88	.06
Number of CA Sites	.05	3.16	.002
Size of Facility	2.01	1.44	.15
$\mathbf{R^2}$ = .20	**N** = 125		

Exhibit 1.8
Regression Results for Asking About Refrigeration Equipment Which Saves Energy

Variable	Coefficient	T Value	P > t
Intercept	-2.78	-1.33	.19
Group	3.84	2.28	.02
Number of Employees	-.03	-1.21	.23
Number of CA Sites	.05	3.97	.0001
Size of Facility	.56	.54	.59
$\mathbf{R^2}$ = .17	**N** = 126		

Exhibit 1.9
Regression Results for Asking About Ventilation Equipment Which Saves Energy

Variable	Coefficient	T Value	P > t
Intercept	-2.80	-2.16	.03
Group	2.52	2.40	.02
Number of Employees	-.01	-.64	.52
Number of CA Sites	.04	5.24	.0001
Size of Facility	.54	.85	.40
$\mathbf{R^2}$ = .25	**N** = 125		

1.6 Sharing Information

This section presents the regression results for the Questions 55 and 56 regarding the sharing of information with colleagues and the use of these ideas in shaping internal policies and practices.

Exhibit 1.10
Sharing Ideas With Colleagues

Variable	Coefficient	T Value	P > t
Intercept	-.91	-.35	.73
Group	2.23	1.03	.30
Number of Employees	.02	.80	.42
Number of CA Sites	.003	.21	.83
Size of Facility	1.49	1.21	.23
R^2 = .03	**N** = 122		

Exhibit 1.11
Using Ideas in Shaping Internal Policies and Practices

Variable	Coefficient	T Value	P > t
Intercept	2.03	.84	.40
Group	.34	.17	.86
Number of Employees	.007	.29	.77
Number of CA Sites	.007	.48	.63
Size of Facility	.93	.82	.42
R^2 = .02	**N** = 122		

2. Factor Analysis

The factor analysis was done using the Prelis 2.30 software. The rules used in these analyses are presented first followed by the results.

2.1 Rules

The following four principles and techniques were used in the factor analyses:

1. varimax rotation was used
2. factor loadings greater than 0.30 were considered to meet the minimal level for inclusion
3. only factors that had latent roots or eigenvalues greater than 1 were considered significant
4. variables with communalities less than 0.50 were eliminated
5. normal distributions were defined as follows:
   a. scores were considered to be moderately nonnormal if they demonstrated a skewness values ranging from 2.00 to 3.00 and kurtosis values from 7.00 to 21.00
   b. extreme nonnormality was defined by skewness values > 3.00 and kurtosis values > 21.00 (Byrne, 1998)

2.2 Results

The following pages present the Prelis 2.30 results of the various factor analyses. The first printout presents the results of examining questions q8a, q8b q8c, q8d, and q8e, which were thought to define a construct having to do with attitudes toward energy conservation, and questions q9, q10, q11rev, q12, q13, q14, and q15, which were thought to define a construct having to do with organizational practices. As one can see, the two factors that emerged were consistent with our a priori ideas about which questions go with which constructs. Note that in the various statistical analysis that examined the hypotheses associated with this project, question Q11rev was not included in the summative scale. The distributions of these variables were reasonably normal with skewness values less than 2.00 and kurtosis values less than 7.00.

The second printout presents the results of examining questions q18a, q18b, q18c, q19a, q19b, q19c, q20a, q20b, and q20c, which were thought to define a construct having to do with performance uncertainty, questions q21a, q21b, q21c, q22a, q22b, q22c, q23a, q23b, and q23c, which were though to define a construct having to do with information/search costs, questions q24a, q24b, q24c, q25a, q25b, q25c, q26a, q26b, and q26c, which were thought to define a construct having to do with asymmetric information. As one can see, nine factors emerged from this analysis. However, each factor appears to be a simple function of the strong correlations among the three questions for each end use for each of the three market barriers that these questions addressed. For example, questions q18a, q18b, and q18c represented the first of three questions for performance uncertainty for each of the three end uses. These three questions are identical except for the end use addressed. The similarity of these three questions accounts for their strong correlations. This, in our opinion, is an artifact of the structure of these questions and does not define some underlying construct. It was decided to create summative scales based on out a priori ideas about which questions define which underlying construct. The distributions of these variables were reasonably normal with skewness values less than 2.00 and kurtosis values less than 7.00.

```
                         DATE: 06/07/1999
                          TIME: 21:51

                         P R E L I S  2.30

                               BY

                  Karl G. Jöreskog & Dag Sörbom


              This program is published exclusively by
              Scientific Software International, Inc.
                 7383 N. Lincoln Avenue, Suite 100
                  Chicago, IL 60646-1704, U.S.A.
       Phone: (800)247-6113, (847)675-0720, Fax: (847)675-2140
     Copyright by Scientific Software International, Inc., 1981-99
       Use of this program is subject to the terms specified in the
                   Universal Copyright Convention.
                     Website: www.ssicentral.com

 The following lines were read from file D:\PG&E\FSTC\ESTIMATE\RICK26.PR2:

 !PRELIS SYNTAX: Can be edited
 SY=D:\PG&E\FSTC\ESTIMATE\RICK26.PSF
 SE 1 2 3 4 5 6 7 9 10 11 12
 FA
 OU MA=CM XM


 Total Sample Size =    136
```

Univariate Summary Statistics for Continuous Variables

Variable	Mean	St. Dev.	T Value	Skewness	Kurtosis	Minimum	Freq.	Maximum	Freq.
q8a	8.456	1.833	53.789	-1.129	0.626	2.000	1	10.000	62
q8b	7.835	2.232	40.935	-1.196	0.988	1.000	3	10.000	41
q8c	6.667	2.397	32.441	-0.431	0.595	0.000	1	10.000	20
q8d	7.191	2.674	31.367	-0.755	-0.370	1.000	7	10.000	40
q8e	7.537	2.497	35.198	-0.887	-0.190	1.000	2	10.000	44
q9	4.132	3.306	14.576	0.597	-1.188	1.000	50	10.000	16
q10	5.882	3.158	21.724	-0.045	-1.315	1.000	17	10.000	33
q12	6.485	2.849	26.544	-0.375	-0.929	1.000	10	10.000	33
q13	8.743	1.901	53.626	-1.763	3.056	1.000	2	10.000	78
q14	5.221	3.390	17.960	0.127	1.477	0.000	1	10.000	26
q15	3.515	3.141	13.049	0.930	-0.652	1.000	64	10.000	11

Unrotated Factor Loadings

	Factor 1	Factor 2	Unique Var
q8a	0.612	-0.159	0.600
q8b	0.730	-0.260	0.399
q8c	0.564	-0.107	0.670
q8d	0.644	-0.250	0.523
q8e	0.653	-0.194	0.536
q9	0.151	0.342	0.860
q10	0.450	0.501	0.547
q12	0.388	0.482	0.617
q13	0.305	0.177	0.876
q14	0.367	0.326	0.759
q15	0.272	0.592	0.576

Minimum Fit Function Chi-Square with 34 Degrees of Freedom =   70.55

Varimax-Rotated Factor Loadings

	Factor 1	Factor 2	Unique Var
q8a	0.619	0.127	0.600
q8b	0.770	0.088	0.399
q8c	0.554	0.153	0.670
q8d	0.688	0.059	0.523
q8e	0.671	0.113	0.536
q9	-0.015	0.374	0.860
q10	0.183	0.648	0.547
q12	0.136	0.604	0.617
q13	0.195	0.293	0.876
q14	0.186	0.454	0.759
q15	0.017	0.651	0.576

Factor Correlations

	Factor 1	Factor 2
Factor 1	1.000	
Factor 2	0.187	1.000

The Problem used 15976 Bytes (= 0.0% of available workspace)

```
DATE: 06/06/1999
  TIME: 22:42

P R E L I S  2.30

BY

Karl G. Jöreskog & Dag Sörbom
```



```
The following lines were read from file D:\PG&E\FSTC\ESTIMATE\RICK26.PR2:

!PRELIS SYNTAX: Can be edited
SY=D:\PG&E\FSTC\ESTIMATE\RICK26.PSF
SE 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41
FA
OU MA=CM XM
```

Total Sample Size = 136

Univariate Summary Statistics for Continuous Variables

Variable	Mean	St. Dev.	T-Value	Skewness	Kurtosis	Minimum	Freq.	Maximum	Freq.
q18a	8.559	1.984	50.302	1.818	3.304	1.000	2	10.000	65
q18b	8.772	1.708	59.886	-1.765	3.225	2.000	2	10.000	70
q18c	8.551	2.010	49.605	-1.742	2.926	1.000	2	10.000	67
q19a	6.699	3.087	25.304	-0.577	-0.964	0.000	1	10.000	39
q19b	6.596	3.032	25.372	-0.476	1.034	0.000	1	10.000	38
q19c	7.000	3.057	26.700	-0.720	0.805	0.000	1	10.000	44
q20a	4.169	3.085	15.758	0.621	1.023	1.000	38	10.000	12
q20b	4.162	2.979	16.289	0.593	-0.960	1.000	37	10.000	10
q20c	4.044	3.030	15.563	0.623	0.980	1.000	43	10.000	10
q21arev	3.184	3.021	12.289	0.531	-1.061	0.000	42	9.000	10
q21brev	3.301	2.950	13.052	0.503	1.011	0.000	36	9.000	10
q21crev	3.743	3.218	13.563	0.262	-1.316	0.000	39	9.000	16
q22a	5.265	3.257	18.848	0.104	-1.414	1.000	25	10.000	23
q22b	5.368	3.227	19.399	0.086	-1.387	1.000	22	10.000	25
q22c	5.816	3.181	21.320	-0.166	-1.311	0.000	1	10.000	27
q23a	7.088	2.927	28.237	-0.858	0.463	1.000	13	10.000	39
q23b	6.993	2.884	28.274	-0.760	0.618	1.000	10	10.000	38
q23c	6.985	2.908	28.009	-0.805	0.543	1.000	12	10.000	35
q24a	6.618	3.075	25.101	-0.541	-0.899	0.000	1	10.000	39
q24b	6.691	3.034	25.716	-0.527	0.922	0.000	1	10.000	40
q24c	6.522	3.122	24.361	-0.556	-0.900	0.000	2	10.000	37
q25a	6.221	2.966	24.461	-0.338	-0.928	0.000	3	10.000	29
q25b	6.199	2.854	25.328	-0.248	0.759	0.000	3	10.000	31
q25c	6.044	2.921	24.132	-0.265	-0.799	0.000	4	10.000	29
q26a	5.838	2.642	25.769	-0.248	-0.509	0.000	2	10.000	18
q26b	5.757	2.693	24.933	-0.216	-0.675	0.000	2	10.000	17
q26c	5.963	2.631	26.427	-0.284	-0.364	0.000	3	10.000	20

Unrotated Factor Loadings

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
q18a	0.464	-0.279	-0.151	-0.207	0.063	0.362
q18b	0.328	-0.192	-0.133	-0.249	0.078	-0.230
q18c	0.436	0.291	-0.265	-0.180	0.078	-0.335
q19a	0.498	-0.186	0.242	-0.271	0.647	-0.145
q19b	0.432	-0.099	0.258	-0.187	0.653	-0.141
q19c	0.424	0.177	0.160	-0.323	0.669	0.182
q20a	0.818	0.475	0.151	-0.125	-0.152	0.053
q20b	0.775	0.496	0.203	-0.114	-0.140	0.091
q20c	0.755	0.460	0.153	0.136	0.145	0.047
q21arev	-0.070	-0.204	0.647	0.326	0.116	0.411
q21brev	0.038	-0.219	0.629	0.337	0.192	0.429
q21crev	-0.120	-0.250	0.626	0.285	0.122	0.344
q22a	0.557	-0.443	0.319	0.293	-0.091	-0.222
q22b	0.505	-0.416	0.323	0.316	-0.095	-0.207
q22c	0.495	-0.436	0.228	0.252	-0.071	0.271
q23a	0.425	-0.506	0.108	0.069	-0.380	0.225
q23b	0.303	-0.556	0.146	0.002	0.422	-0.207

q23c	0.351	-0.556	0.101	0.076	-0.395	-0.260
q24a	0.425	0.541	-0.259	-0.165	-0.072	0.476
q24b	0.368	-0.457	0.185	-0.155	0.001	0.551
q24c	0.386	-0.472	-0.223	-0.142	-0.006	0.441
q25a	0.548	0.341	-0.374	0.174	0.029	0.158
q25b	0.559	-0.293	-0.341	0.136	-0.022	0.194
q25c	0.490	-0.355	-0.356	0.171	0.008	0.143
q26a	0.533	0.182	-0.397	0.568	0.219	0.012
q26b	0.514	0.179	-0.330	0.579	0.247	0.037
q26c	0.497	0.189	-0.439	0.627	0.184	-0.018

Unrotated Factor Loadings

	Factor 7	Factor 8	Factor 9	Unique Var
q18a	-0.048	0.193	0.537	0.178
q18b	-0.056	0.181	0.397	0.523
q18c	-0.092	-0.266	0.534	0.140
q19a	0.170	0.093	-0.084	0.101
q19b	0.090	0.047	-0.146	0.224
q19c	0.156	0.039	-0.142	0.133
q20a	0.003	-0.001	0.034	0.039
q20b	0.029	0.006	0.014	0.069
q20c	-0.013	-0.073	-0.023	0.146
q21arev	0.077	0.148	0.218	0.171
q21brev	0.029	0.103	0.310	0.114
q21crev	-0.062	0.092	0.242	0.245
q22a	-0.269	-0.183	-0.198	0.103
q22b	-0.337	-0.219	-0.202	0.114
q22c	-0.279	0.195	-0.095	0.246
q23a	0.415	0.230	0.028	0.127
q23b	0.351	0.271	-0.038	0.158
q23c	0.347	0.207	0.019	0.164
q24a	0.180	0.295	-0.022	0.081
q24b	0.155	-0.236	-0.113	0.201
q24c	0.133	-0.249	-0.206	0.241
q25a	-0.345	0.385	-0.006	0.119
q25b	-0.391	0.291	0.057	0.188
q25c	0.347	0.420	-0.015	0.161
q26a	0.156	0.046	-0.003	0.129
q26b	0.099	-0.008	-0.004	0.187
q26c	0.112	0.074	0.030	0.078

Varimax-Rotated Factor Loadings

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
q18a	0.089	0.046	0.079	0.054	0.150	0.169
q18b	0.076	0.081	0.088	-0.021	0.137	0.057
q18c	0.027	0.104	0.134	0.104	0.097	0.089
q19a	0.140	0.087	-0.089	0.048	0.901	0.085
q19b	0.132	0.031	-0.085	0.075	0.846	-0.028
q19c	0.074	0.101	0.026	0.019	0.903	0.023
q20a	0.937	0.018	0.041	0.185	0.115	0.043
q20b	0.935	0.020	0.010	0.165	0.129	0.032
q20c	0.888	0.045	0.077	0.144	0.111	-0.003
q21arev	-0.031	-0.007	-0.885	-0.069	0.018	0.016
q21brev	0.011	0.066	0.927	0.028	0.094	0.048
q21crev	-0.097	-0.006	-0.839	-0.112	0.025	0.022
q22a	0.126	0.106	-0.141	0.102	0.137	0.257
q22b	0.107	0.087	0.149	0.087	0.088	0.181
q22c	0.063	0.069	-0.094	0.097	0.106	0.221
q23a	0.075	0.138	-0.036	0.058	0.047	0.887
q23b	0.000	0.124	-0.032	-0.086	0.018	0.877
q23c	0.008	0.115	-0.021	0.012	0.008	0.863
q24a	0.024	0.895	0.022	0.055	0.028	0.177
q24b	0.041	0.856	-0.075	0.037	0.082	0.091
q24c	0.016	0.821	0.037	0.055	0.107	0.115
q25a	0.088	0.228	0.083	0.114	0.120	0.113
q25b	0.148	0.241	0.037	0.118	0.032	0.052
q25c	0.049	0.193	0.076	0.080	0.102	0.134
q26a	0.170	0.084	0.088	0.899	0.065	0.000
q26b	0.170	0.063	0.006	0.869	0.077	0.038
q26c	0.132	-0.001	0.067	0.936	-0.002	0.026

Varimax-Rotated Factor Loadings

	Factor 7	Factor 8	Factor 9	Unique Var
q18a	0.137	0.136	0.845	0.178
q18b	0.112	0.061	0.647	0.523
q18c	0.150	0.145	0.871	0.140
q19a	0.100	0.080	0.164	0.101
q19b	0.054	0.137	0.081	0.224
q19c	0.077	0.068	0.156	0.133
q20a	0.117	0.080	0.106	0.039
q20b	0.076	0.067	0.028	0.069

q20c	0.064	0.117	0.079	0.146
q21arev	-0.027	0.117	-0.155	0.171
q21brev	-0.064	0.073	-0.047	0.114
q21crev	-0.073	0.123	-0.088	0.245
q22a	0.109	0.856	0.100	0.103
q22b	0.098	0.883	0.085	0.114
q22c	0.114	0.781	0.209	0.246
q23a	0.079	0.174	0.131	0.127
q23b	0.113	0.183	0.050	0.158
q23c	0.084	0.226	0.138	0.164
q24a	0.197	0.070	0.196	0.081
q24b	0.197	0.040	0.044	0.201
q24c	0.198	0.125	0.024	0.241
q25a	0.861	0.096	0.150	0.119
q25b	0.810	0.135	0.197	0.188
q25c	0.858	0.088	0.119	0.161
q26a	0.050	0.088	0.063	0.129
q26b	0.084	0.103	0.023	0.187
q26c	0.138	0.055	0.037	0.078

Factor Correlations

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Factor 1	1.000					
Factor 2	0.285	1.000				
Factor 3	0.148	0.218	1.000			
Factor 4	-0.217	0.077	0.048	1.000		
Factor 5	0.306	0.202	0.190	0.266	1.000	
Factor 6	0.254	0.121	0.177	0.061	0.433	1.000
Factor 7	0.351	0.173	0.106	0.079	0.260	0.384
Factor 8	0.339	0.237	0.178	0.128	0.238	0.280
Factor 9	0.193	0.055	0.320	-0.058	0.193	0.101

Factor Correlations

	Factor 7	Factor 8	Factor 9
Factor 7	1.000		
Factor 8	0.463	1.000	
Factor 9	0.111	0.231	1.000

The Problem used 63240 Bytes (= 0.1% of available workspace)

3. Household Forecast

The household forecast was based on historical California household data from the U.S. Bureau of the Census for the period 1980 through 1998. A variety of models were explored and tested. The model that emerged as superior was one that used the Holt exponential smoothing with a linear trend and no seasonality. The resulting R^2 for the estimated model was 0.9885, with a Durbin Watson of 2.012, a non-significant Ljung-Box statistic, and a root mean square error of 0.09. Exhibit 3.1 presents the household and restaurant forecasts through 2010.

Exhibit 3.1
Household and Restaurant Forecasts (000)

	Households	Restaurants
1980	8.4	48.0
1981	8.6	49.3
1982	8.8	49.9
1983	8.8	50.4
1984	9.0	51.5
1985	9.2	52.6
1986	9.4	53.7
1987	9.6	54.8
1988	9.8	56.0
1989	10.1	57.3
1990	10.1	57.8
1991	10.3	58.6
1992	10.5	59.8
1993	10.6	60.2
1994	10.6	60.3
1995	10.7	60.9
1996	10.8	61.8
1997	11.0	62.6
1998	11.1	63.5
1999	11.2	64.1
2000	11.4	64.8
2001	11.5	65.6
2002	11.6	66.4
2003	11.8	67.1
2004	11.9	67.9
2005	12.0	68.7
2006	12.2	69.4
2007	12.3	70.2
2008	12.5	71.0
2009	12.6	71.8
2010	12.7	72.5

4. Estimation of Technical Potential

Technical potential was estimated using data obtained from the Characterization of Commercial Building Appliances (Final Report) prepared by Arthur D. Little in

1993 for the U.S. Department of Commerce, National Technical Information Service. Exhibit 4.1 presents the estimates for each of the key technologies. Note that column contains the number, 72,500, which is the number of restaurants forecasted to exist in California in 2010. The methods used to calculate the economic and market potential are described in Section 4.4.1. The technical potential from Exhibit 4.1 for cooking, refrigeration, and cooking equipment are presented in Exhibit 5.86.

Exhibit 4.1
Estimation of Technical Potential

	% Establishments With One Or More	Total Establishments	Average Number Per Establishment	Total
Cooking Equipment				
Broilers Commercial				
Overfired	0.09	72500	1.3	8,483
Salamander	0.082	72500	1.2	7,134
Underfired	0.16	72500	1.2	13,920
Total Broilers				29,537
Fryers				
Pressure	0.124	72500	2.2	19,778
Floor Mounted	0.521	72500	2.3	86,877
Countertop	0.308	72500	1.7	37,961
Total Fryers				144,616
Griddles				
Griddles & Grills	0.617	72500	1.4	62,626
Sandwich Grills	0.0675	72500	1.4	6,851
Total Griddles				69,477
Ovens				
Deck	0.278	72500	1.9	38,295
Convection(1/2)	0.121	72500	1.2	10,527
Convection (Full)	0.318	72500	1.6	36,888
Combination	0.047	72500	1.6	5,452
Rotary Rack	0.021	72500	1.1	1,675
Rotary Rack	0.018	72500	1.1	1,436
Cook & Hold	0.145	72500	1.6	16,820
Conveyor	0.039	72500	1.4	3,959
Dough Proofer	0.112	72500	1.2	9,744
Total Ovens				124,794
Ranges				
Light Duty	0.174	72500	1.2	15,138
Heavy Duty	0.356	72500	1.6	41,296
Total Ranges				56,434
Steamers				
Atmospheric	0.072	72500	1.5	7,830
Low Pressure	0.071	72500	1.2	6,177
High Pressure	0.066	72500	1.5	7,178
Total Steamers				21,185
Total Cooking Equipment				446,042
Refrigeration Equipment				
Unit Coolers	1	72500	3	217,500
Refrigeration	1	72500	1	72,500
Total Refrigeration Equipment				290,000
Total Ventilation Equipment	1	72500	1	72,500

5. References

Belsley, D.A., Kuh, E., and Welsch, R.E. (1980), *Regression diagnostics*, New York: John Wiley & Sons, Inc.

Britan, G. M. (1978), Experimental and Contextual Models of Program Evaluation. Evaluation and Program Planning 1: 229-234.

Byrne, Barbara. (1998), *Structural equation modeling with LISREL, PRELIS, and SIMPLIS: Basic concepts, applications, and programming*. Mahwah, New Jersey: Lawrence Erlbaum Associates, Publishers.

Eto, Joseph, Ralph Prahl, and Jeff Schelgel (1996), A scoping study on energy efficiency market transformation by California utility DSM programs, Prepared for the California Demand-Side Management Advisory Committee (Project 2091T).

Goldberg, M. L. And K. Train (1995), Net Savings Estimation: An Analysis of Regression and Discrete Choice Approaches. Submitted by Xenergy Inc. to the CADMAC Subcommittee on Base Efficiency.

Guilford, J. P. and Benjamin Fruchter (1973), *Fundamental statistics in psychology and education*, New York: McGraw-Hill Book Company.

Joreskög, Karl and Dag Sörbom, (1999), LISREL 8, Scientific Software International, Chicago, Ill.

Joreskög, Karl and Dag Sörbom, (1999), PRELIS 2, Scientific Software International, Chicago, Ill.

Little, Arthur D. (1993), Characterization of commercial building appliances (Final Report) (1993), Prepared for the U.S. Department of Commerce, National Technical Information Service.

Mahajan, Vijay, and Robert A. Peterson. (1985), *Models for innovation diffusion*. Newbury Park, CA: SAGE Publications.

Mahajan, Vijay, Eitan Muller, and Rajendra K. Srivastava (1990), Determination of adopter categories by using innovation diffusion models, *Journal of Marketing Research*, Vol. XXVII, pp. 37-50.

Meyers, R.H. (1990), *Classical and modern regression with applications*. Second Edition, Boston: PWS and Kent Publishing Company, Inc.

Patton, Michael Quinn (1987), How to use qualitative methods in evaluation. Newbury Park, California: SAGE Publications.

Rogers, Everett M. (1995), *Diffusion of innovations*, New York: The Free Press.

SRC (1990), SRC/COMPASS: Comprehensive market planning and analysis system (Version 1.3E), Synergic Resources Corporation, Bala Cynwyd, PA.

Stellwagen, Eric A. and Robert L. Goodrich (1997), Forecast Pro for Windows, Business Forecast Systems, Belmont , MA

Sultan, Fareena, John U. Farley, and Donald R. Lehmann (1990), A meta-analysis of applications of diffusion models, *Journal of Marketing Research*, Vol. XXVII, pp. 70-77.

Weiss, Carol H. (1998), *Evaluation*, Upper Saddle River, New Jersey: Prentice Hall.

Weiss, R. S. and M.Rein. (1972), *The Evaluation of broad-aim programs: Difficulties in experimental design and an alternative*, In C. H. Weiss (ed.) Evaluating Action Programs: Readings in Social Action and Education. Boston: Allyn and Bacon.

Appendix I
Focus Group Notes

R J RESEARCH

6948 Eagle Ridge Rd., Penngrove, CA 94951 • (707) 795-3780 • FAX (707) 795-7529

FOOD SERVICE TECHNOLOGY CENTER
FOCUS GROUP SUMMARY
RJR 99-477

ENERGY EFFICIENCY PERCEPTION

Many of the participants agreed that when end-users claimed that energy efficiency is important in purchasing equipment, it was the "right thing to say" in the context of being surveyed.

All agreed that energy efficiency is important for many end-users, but is less significant in the purchase decision compared to other criteria, particularly price and performance.

Several participants firmly believed that energy efficiency is part of the equipment performance equation, e.g., less cooling time produces a more effective product performance which results in a more energy efficient option.

A number of participants believed that chains have a higher interest in energy efficiency (due primarily to the magnitude of savings in aggregate) versus "Mom and Pop's" who they claim would experience inconsequential savings in the short-term.

ENERGY EFFICIENCY LABELING SYSTEM

Most of the participants disagreed with the Equipoise team's perspective on an energy efficiency labeling system.

A number of participants agreed that a labeling system would enhance the equipment purchase decision-making process i.e., easier and better/more information. However, numerous reasons were provided for the disagreement with no one item that surfaced as the main point of contention –

> Some belabored the point that performance is the most important purchase criteria, considerably more so than energy efficiency.

Some contended that a segment of end-users (i.e., Mom and Pop's) have no interest in energy efficiency.

A few claimed that manufacturers would balk at such a system.

Several thought that the price of such a system would be reflected in higher costs to end-users.

A couple of participants believed that such a system would place an undue focus on energy efficiency and possibly result in ignoring other key purchase criteria.

In addition to some of the above items, several of the participants believed there would be other changes resulting from such a system, including –

More consultants

Less manufacturers

Reduction in the number of models offered

A few agreed with one participant who believed that an effective approach to introduce a labeling system in the industry would be via a web site.

ENERGY EFFICIENCY STANDARDS

Most of the participants disagreed with the Equipoise position on energy efficiency standards.

Most members agreed that because of the diversity of the industry and expectations, there will never be a set of standards that would be voluntarily agreed to by the variety of factions.

A few participants contended that the only viable approach to introduce standards into the industry would be via a disinterested third party or a government mandate.