Residential Retrofit Market

Training Needs Assessment

Market Size & Training Opportunities

Prepared for
Pacific Gas and Electric Company

Freeman, Sullivan & Co.
131 Steuart Street, Suite 500
San Francisco, CA 94105
www.fsc-research.com

August 31, 1999

Table of Contents

Appendix 3: Table of training opportunities made for discussion

Appendix 4: Discussion guide for focus group with general contractors held in Walnut Creek, California

Legal Notice

This report was prepared for Pacific Gas and Electric Company (PG&E) for the exclusive use of its employees and agents. Neither PG&E nor any of its employees and agents:

1. makes any written or oral warranty, expressed or implied, including, but not limited to those concerning merchantability or fitness for a particular purpose;
2. assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, process, method, or policy contained herein; or
3. represents that its use would not infringe any privately owned rights, including, but not limited to, patents, trademarks, or copyrights.

Executive Summary

This report focuses on the part of the housing construction market served by Pacific Gas and Electric Company's (PG&E's) Residential Retrofit and Renovation Program. It summarizes research meeting the California Board for Energy Efficiency (CBEE) milestone: "Estimate the size of the [Residential Retrofit and Renovation] market for building professionals, and identify opportunities for training."

The deliverables of this document, market size and training opportunities, can be found under their respective headings within each market actor section.

The information in this report was compiled from a variety of sources including:

- market research reports provided by PG&E,
- reactions of participants at the Retrofit and Renovation Year 2000 Planning Public Input Workshop,
- a focus group with general contractors specializing in renovation, and
- executive interviews with various parties involved in providing training to the actors in this market.

The following important conclusions can be drawn from this work:

1. There are significant opportunities to provide customized training for the estimated 37,000 general contractors (and their employees) in PG&E's service territory. General contractors will attend classes that are designed to acquaint them with “cutting edge” energy-efficient technologies and practices, and classes that cover the relationship between cost and comfort for different energy efficiency alternatives. General contractors see Energy Efficiency Mortgages (EEMs) as a potentially powerful marketing tool and are therefore very interested in learning how to help homeowners use them, especially with regards to refinancing to support remodeling. They are interested in learning more about the technical aspects of what their sub-contractors do, and are prepared to send their lead tradesmen to classes explaining how energy efficient technology should be incorporated into modern buildings. Finally, they are very interested in classes explaining the workings of Title 24 and the recent changes that have been adopted therein.

2. There are also significant opportunities to provide training to the 1,200 Heating, Ventilating and Air Conditioning (HVAC) contractors (and their employees) in PG&E's service territory. HVAC contractors are interested in receiving clear-cut information describing the benefits (e.g. comfort) and costs of energy-efficient equipment and practices. They want to know

exactly what equipment and practices are considered to be energy-efficient, and they want to be able to clearly explain the benefits customers will receive from the installation of energy-efficient equipment. On the technical side, HVAC contractors are interested in receiving training in duct sizing and duct sealing. They are also interested in classes on Title 24 requirements as they pertain to HVAC and are particularly interested in a class that specifically focuses on the recent Title 24 changes and the implications for HVAC contractors.

3. There are significant opportunities to provide training to the estimated 1,800 building code officials (i.e., plan checkers and building inspectors) working in Northern California concerning compliance with Title 24 requirements. Classes for these parties should focus on how to inspect for Title 24 compliance; how to ensure compliance with requirements established by recent changes to the code; and, proper installation practices for technologies covered by Title 24 (i.e., windows, insulation and HVAC system components).

4. Substantial numbers of the actors in the retrofit and renovation market pass through home centers (i.e., retail stores specializing in home improvement and construction materials) at some time during the course of their renovation projects. Consequently, these stores provide an excellent opportunity to communicate information about energy efficiency to decision makers before and during the selection of appliances and

equipment. Training should be offered to sales staffs in the estimated 120 home centers in Northern California regarding the comfort, performance and costs associated with energy-efficient building materials and equipment sold in their stores. Training could focus on windows, water heaters and other energy-efficient products and how they benefit the overall comfort of a home. It could also ensure that store personnel are well acquainted with the performance characteristics and benefits of EnergyStar® labeled products. There is also an opportunity to distribute instructional video tapes emphasizing the advantages of energy efficient equipment and installation practices for viewing the contractors and homeowners on store premises.

5. There are several opportunities to provide training to actors who are or will be offering products or services related to EEMs. These include:

- for home inspectors -- a class explaining how to provide an energy efficiency evaluation as part of the services they currently offer;

- for lenders -- a class explaining the requirements for qualifying for energy efficiency mortgages; the steps required to successfully fund an EEM and the roles and responsibilities of CHEERS raters and other inspectors who may be involved in the process;

- for "facilitators" -- a class explaining what it means to be a “facilitator”. This class could deal with the specifics of lender requirements, the role of home inspectors and CHEERS raters in the process, and how to work with contractors once the work is decided upon. A class tailored to general contractors who expressed great interest in EEMs as a marketing tool might also be developed.

Based on the information gathered in this report, FSC recommends these follow-up actions:

1. additional research and focus groups to expand course content, target audience, delivery (i.e. STC vs. onsite/in-field), preferred schedule, and marketing approach, etc; and

2. an analysis of the 1999 training program, based on the level of attendance for different classes, test results, marketing approach used, feedback from trainees, etc., to help fine-tune next year's program.

Section 1: Introduction

Milestone

Market Transformation has emerged as a central policy objective of future publicly funded energy efficiency programs in California. In order to adapt to this policy change, PG&E has developed programs to transform the construction market by training market actors about energy efficiency. This report deals with the Residential Retrofit and Renovation Program part of the construction market.

This research was conducted to satisfy the California Board for Energy Efficiency (CBEE) milestone: "Estimate the size of the [Residential Retrofit and Renovation] market for building professionals, and identify opportunities for training." The CBEE is an part of the California Public Utilities Commission (CPUC) that, among other things, monitors the efficacy and success of conservation programs in place throughout the state. This program "milestone" was set by the CBEE to target opportunities for training the market actors. It was also important to determine market size when developing training classes, seminars, workshops, etc.

This report meets the CBEE's milestone. The information in this report was gathered from market research provided by PG&E, a public input workshop, a focus group, and executive interviews. Market size and training opportunities can be found under their respective headers in the section entitled "Findings". A brief synopsis of each market actor's role has also

been supplied under the "Role" section to help describe the opportunities suggested.

Background

Professionals in the building industry influence the eventual energy efficiency of residential buildings in various ways.

Contractors interpret and apply the construction codes (i.e., California's Title 24) that establish minimum building and system performance standards. They can explain those codes to the homeowner, help them decide among the various technical choices available, and most importantly help them comply with those codes. They can also help consumers understand the comfort and operating cost implications of different building envelope, fenestration, lighting, and HVAC system design alternatives. In the end, the contractor is probably the most important source of information used by consumers to choose from among the various technical alternatives that best suit their desires and needs.

Building code inspectors have a different but equally important function in the retrofit and renovation marketplace. They check construction plans and work being carried out by contractors to ensure compliance with requirements set forth in the building codes. In doing so, they help ensure that minimum energy efficiency standards are met and that technically sophisticated engineering designs used to achieve energy savings are executed properly.

Yet another important function is provided by retailers/home centers in the retrofit and renovation marketplace. They provide literal storehouses of products and information consumers and contractors can use to learn about the costs and benefits of different products and technical design alternatives. They also provide an environment within which it is appropriate and easy to communicate information to consumers and contractors concerning the relative costs and benefits of different design alternatives. One of the key technical challenges in any communications program is to identify parties who are "in the market" at any point in time. Retail stores focused on various kinds of home improvements that literally attract parties who are "in the market" for the goods and services that determine the energy efficiency of remodeling projects.

The potential energy efficiency gains in the retrofit and renovation market place are limited by the training and experience of the above key actors. For example, while most general contractors understand how to comply with Title 24, relatively few understand it well enough to explain the rationale for these requirements to their clients. Even fewer understand the technical issues well enough to evaluate the costs and benefits of the various technical trade-offs described in the recent revisions to the code.

Deficiencies in the information available to market actors can be remedied by providing technical training to them. Identifying crucial training requirements for each of the market actors in the retrofit and renovation market was the central objective of this study.

Approach

The Residential Retrofit and Renovation marketplace consists of a number of different types of building professionals with different training needs. These include:

General contractors	Building code inspectors
HVAC contractors	Home inspectors
Window contractors	CHEERS raters
Electrical contractors	Lenders
Retailers/Home centers	Energy Efficiency Mortgage "facilitators"
Retailers/Specialty shops	Real estate agents

In addition, within some of the above categories, there are multiple actors. For example, depending on the size of the firm, general contractors may employ foremen, framing carpenters, finish carpenters and other trades. Also, HVAC contractors usually have technicians and installers.

Those market actors that require future research to determine market size and training opportunities have been designated in the section entitled "Other Identified Market Actors".

To identify the training needs of this diverse population of market actors, a three-step research process was carried out. In the first step, information on training needs identified during prior research was collected and analyzed. These reports included studies on segments of the market (such as windows,

HVAC, Energy Efficiency Mortgages), and an overall study of the entire Residential Retrofit and Renovation Market.

In the second step, the results of the literature review were summarized and presented at the PG&E Residential Retrofit and Renovation Program Year 2000 Planning Public Input Workshop. Participants in this workshop included general contractors, HVAC contractors, CHEERS Raters, PG&E program planners, representatives from various departments of the state and federal governments, and other California utilities. At the conclusion of the presentation, parties were asked to comment on the findings of the studies and provide additional suggestions for training for various market actors. A copy of the presentation made at the workshop is included in Appendix A.

At the conclusion of the second step, it was apparent that the planning process could be improved by collecting additional information from some of the key market actors. Therefore, in the third and final step of the project, additional information was collected from general contractors, retailers and building inspectors. Further information concerning the training needs of general contractors was collected by means of a focus group consisting of 7 general contractors meeting for a period of 3 hours. The focus group discussion guide is contained in Appendix B. Additional information concerning the needs of retailers and building inspectors was obtained by interviewing training specialists in those market areas.

Organization of Report

In addition to the introduction this report contains two other sections. Section 2 describes the role, market size and training needs of each of the key market actors in the retrofit and renovation market. Section 3 contains a discussion of the research methods used in the study.

Section 2: Findings

General Contractors[1]

Market Size

It is estimated that there are 37,000 active general contractor licenses in PG&E's service territory.[2]

Role

General contractors are involved in over 70 percent of all renovations to kitchens and baths or room additions.[3] In addition to the trades that work directly under their supervision, general contractors usually supervise the work of one or more the measure-specific contractors who provide specialized work such as HVAC or electrical installations. Some general contractors also provide specialized retrofit services, such as window replacements, but this window service is generally not offered as a main line of business.

General contractors obtain new work in one or both of the following ways:

1. They bid on projects based on plans provided by the customer's architect or engineer. In this situation, the general contractor doesn't have much influence on the energy efficiency of the renovations: the

[1] Unless otherwise noted, the information gathered in the section on general contractors is based on a focus group held with 7 general contractors on August 13, 1999, in Walnut Creek, California.
[2] Market size was obtained by allocating the total number of active licenses in the State of California in proportion to the population in PG&E's service territory (estimated at 38 percent of the total state).

energy efficiency has already been defined in the plans based on Title 24 energy efficiency calculations. Usually the customer or their architect/engineer does not design beyond Title 24 requirements.

2. Some contractors exclusively obtain work through personal referrals, as opposed to through a formal bidding process. General contractors say that, about half the time, they become involved in renovation projects before the project has proceeded beyond the conceptual design phase. In such cases, the general contractors develop the project plans in consultation with the homeowner.

   As with the first option, energy efficiency typically is incorporated into the design only as far as Title 24 requirements dictate. But at this stage the general contractors have an *excellent* opportunity to assist homeowners in selecting cost-effective energy-efficient technologies that will ensure their comfort and convenience.

General contractors often subcontract measure-specific installations to sub-contractors. When bidding is based on an architect's plan, general contractors usually solicit prices for specialized installations from sub-contractors with whom they normally work. One general contractor defined the relationship with his HVAC sub-contractor (as well as any subcontractor that he used on a regular basis) as similar to that of auto mechanic. "Once you find someone you can trust, you stick with him, and you bring all your work to him." The other general contractors echoed this sentiment. All the

[3] 1994 – April, "Pacific Gas and Electric Home Remodelers Study Qualitative and Quantitative Results",

contractors in the focus group indicated they preferred sub-contractors that they used repeatedly. They also indicated that having these sub-contractors supply bids in competition with others would be highly unusual. Instead, the following process is used:

1. the general contractor gives their preferred sub-contractor the specifications based on the drawings;
2. the sub-contractor provides descriptive and pricing information based on the specifications; and
3. this information is incorporated into the contractor's bid package.

In bidding to specifications there is little room for enhancing energy efficiency above what has been specified, unless alternative options were included in the bid package.

However, when general contractors are involved in the design phase, they have much more flexibility in specifying the design and performance of the building envelope, fenestration and energy using systems. The general contractors in the focus group identified aesthetics and comfort as paramount concerns for their customers. Because energy efficiency and comfort are highly correlated, the contractors can offer cost-effective energy efficiency options to the customer. However, price is an important consideration. General contractors said that price was the biggest barrier to incorporating higher-end energy efficiency items with most of their

---

Market Strategies Inc., page 71.

customers. As one general contractor put it, a customer would rather have a nicer looking fixture than a more energy-efficient one.

All of the general contractors in the focus group expressed interest in energy efficiency, and in fact said building with energy efficiency in mind was a given in the retrofit and renovation market. They said that while they do not often speak with customers specifically about energy efficiency, they believe that consumers expect them to build with energy efficiency in mind.

The general contractors cited Title 24 requirements as the area where energy efficiency considerations usually come into play. All 7 general contractors expressed strong interest in learning more about the basics of Title 24, as well as the recent changes that have been made to the code.

Contractors believe comfort and aesthetic interests drive the choices their customers are making. Energy efficiency comes into play when comfort is considered. The relatively low cost of energy and the moderate climate in a considerable portion of PG&E's service territory reduces the importance of long-term financial savings as a motivating factor. However, in some areas like the Central Valley, where air conditioning is necessary, it is more common to discuss energy efficiency in terms of financial savings, especially HVAC duct sizing and window quality. However, it should be kept in mind that general contractors said energy efficiency is a given in these situations, and that they would, as a matter of course, suggest the most reasonable and energy-efficient units as the best choice. In these situations, the issue becomes their degree of knowledge about energy efficiency.

One exception to this trend among general contractors is lighting. Even though energy-efficient lighting applies to all of the climate zones in PG&E's service territory, general contractors do not tend to specify energy-efficient lighting.

Training Opportunities

1. General contractors are very interested in learning about new energy efficient technology. They want to know what is in the works for the future, and what new energy efficiency options are available to them. All said they would attend classes on new and cutting-edge, energy-efficient products. There was a general consensus that lack of information regarding the specifics of energy-efficient technology limits their ability to suggest alternatives. Also, they believe that keeping abreast of new and upcoming changes in the industry can give them the upper hand with their competitors. It is important, when developing training for general contractors, to keep in mind that their customers are more motivated by comfort than long-term financial savings when going above Title 24 requirements. So education on new energy-efficient technology should emphasize the relationship between cost and comfort.
2. To the extent that Energy Efficiency Mortgages (EEMs) can be employed in refinancing for retrofit or renovation, the general contractors were interested in learning about how to become "facilitators" of these products. None of the contractors in the focus group had heard of EEMs. However, on the basis of the rudimentary information provided in the

focus group setting, most said this mechanism offered a promising way to support business development. They were also interested in promoting and working on whole-house approach[4] as considered under the EEM. They felt this offered a strong opportunity to increase the scope of their work, and therefore increase their profits. Without the EEM, they felt homeowners would be unlikely to choose the whole-house approach.

3. The general contractors were interested in learning more about the technical aspects of what their sub-contractors do. For example, they expressed an interest in obtaining more general knowledge about HVAC energy-efficient items such as duct sealing and load sizing. This would help general contractors answer their customers' questions, and give them more information when working with their sub-contractors.

4. In addition to classes designed to meet their individual needs, general contractors also expressed interest in classes that could be offered to their lead tradesmen (i.e., foremen and site managers), explaining energy-efficient technology, such as lighting fixtures, and practices that are being incorporated into building designs.

5. General contractors are interested in training related to Title 24.[5] They have limited knowledge of Title 24 requirements, especially regarding recent changes, and are interested in attending classes that will help them develop their knowledge in this area. They are looking for in-depth information on how Title 24 calculations work, what the technical

[4] PG&E defines the whole-house approach as follows: "A house is a system made of appliances, equipment, and building materials whose characteristics and how they are used, impact each other and the house environment. The whole house approach to retrofitting and renovating takes into account how each interrelated house component impacts others. For example, if a renovation will include both upgrading insulation and a new air conditioner - the improved thermal shell should be factored into the new air conditioners sizing calculation - allowing for a smaller, less energy consuming unit."

[5] All of the training opportunities identified for general contractors were identified during the focus group identified in footnote (1).

specifics are, and how they can better explain to their customers the rationale behind the requirements. Contractors say that their customers are often surprised and annoyed by the restrictions placed on them by Title 24. Contractors believe that if they had a better understanding of these requirements, they would appear more knowledgeable to their customers. It would also help them to train their personnel and persuade customers that energy efficiency requirements are in their interest.

6. There was interest in a class explaining how to market energy-efficient technology, such as lighting or bathroom fixtures, and practices for different market situations.
7. General contractors were not enthusiastic about attending basic energy efficiency classes. Most felt that energy efficiency training was useful to them as professionals only when applied to specific aspects of their role as general contractor.
8. They were not interested in information about how to market themselves as energy efficiency specialists since they considered this to be an elemental part of their job description. In other words, they do not see it as something that can be used to distinguish themselves from others.

HVAC Contractors[6]

Market Size

It is estimated that there are 1,200 HVAC contractors in PG&E's service territory.[7]

Role

Unlike general contractors, HVAC contractors offer a specialized service in the retrofit and renovation market. Most retrofits of HVAC units are precipitated by the breakdown of a unit, requiring an upgrade or unit replacement. Over one-third (38 percent) of residential HVAC activity involves the "replacement of existing equipment."[8] In these situations, the HVAC contractor is hired directly by the homeowner and has a direct opportunity to offer energy efficiency as an option to consider in developing a new system. HVAC contractors generally cited increased (or incremental) cost of energy-efficient HVAC equipment as a major barrier to adoption.[9]

Over one-half of customers simply call a single HVAC contractor and have them do the work, requesting no bids or only one bid.[10] This means that

[6] Unless otherwise noted, all information in this section is based on HVAC contractor input during PG&E Residential Retrofit and Renovation Program Year 2000 Planning Public Input Workshop held at the San Ramon Learning Center on July 27, 1999.
[7] 1999 –July, PowerPoint presentation entitled "Residential HVAC Program Market Characterization and Baseline Study", prepared for PG&E by Opinion Dynamics Corp., page 5 of presentation.
[8] 1999 – May, "Residential HVAC Market Transformation Market Characterization and Baseline Study", prepared for PG&E by Opinion Dynamics Corp., section VII, page 9.
[9] Ibid., section V, page 21.
[10] Ibid., section V, page 32.

HVAC contractors, from a competitive standpoint, are well placed to suggest higher-end, energy-efficient HVAC units to their customers. While energy efficiency is a topic commonly mentioned, this discussion with the customer is limited by the HVAC contractor's interest in and knowledge of energy-efficient units, duct sizing and load calculations.

HVAC contractors are also hired by general contractors to make the necessary changes to HVAC systems that correspond with building improvements. This happens when the HVAC retrofit or replacement is discretionary or brought on by the renovation itself. In about half of all renovations, additions to conditioned floor area or other changes to the building envelope cause significant changes to the building energy load. At a minimum this change requires installation of additional supply and return ducts to support the new load and may require upgrading or replacement of the existing HVAC system.[11]

As indicated above, FSC presented preliminary findings from its review of the literature at the Year 2000 Public Workshop and discussed the results with those in attendance. The HVAC contractors present said that trying to "up-sell" energy efficient equipment during renovations was difficult and unlikely when they were sub-contracting to general contractors.

As the renovation market currently stands, HVAC energy efficiency is determined by minimum compliance, based on Title 24 requirements, and derived from the plans of the architect or general contractor. The HVAC

contractors said there is little opportunity for them to advocate designs that exceed Title 24 compliance. HVAC contractors also stated that general contractors have little knowledge of the details of Title 24 compliance, and therefore are reluctant to deviate from what has been specified in the Title 24 document.

Currently there is more work than can be handled by the available trained, well-qualified HVAC technicians and installers.[12] Because of this shortage, there is only a small incentive for technicians and contractors to improve their skill level. Any training programs PG&E provides should take this into account, and should coordinate with industry-accepted organizations (including technical schools) to bring more skilled workers into this labor force.

Training Opportunities

1. Training should be provided to HVAC contractors on effective sales methods.[13] It was revealed that HVAC contractors have a misconception regarding their consumers' needs when replacing or upgrading their HVAC unit. HVAC contractors believe they do not have the time and latitude to up-sell, when in fact customers are receptive to energy efficiency options.[14] This, coupled with the contractors' lack of effective sales approach to explain the benefits of energy-efficient HVAC systems,

---

[11] 1999 - March, "PG&E Energy Efficiency Training Survey: Final Report", prepared for PG&E by Quantum Consulting Inc., page 4-13.
[12] Op. Cit. (8), section IX, page 39.
[13] 1999 – June, "Residential Heating and Cooling Systems Program – Three Year Market Transformation Plan", pages 21-22.
[14] Op. Cit. (8), section VI, pages 62-63.

limits the options HVAC contractors offer to consumers.[15] Thus, consumers have limited access to comprehensive information sources (and fail to take advantage of what resources there are) to help them make energy efficiency decisions. In training on sales techniques, the topic of upselling, where warranted, should also be incorporated. A class like this would provide valuable sales skills and tools to promote energy-efficient HVAC options.

2. On the technical side of HVAC energy efficiency, the contractors in this market suggested that training in duct sizing and duct sealing would be valuable and attract their interest. Many contractors rely on rules of thumb and past experience in sizing and installing equipment. In many cases, duct sizing/layout is done without calculations and without sufficient customer input regarding comfort issues. Some specific areas of weakness identified include: checking refrigerants and coil airflow; checking and repairing ducts as part of replacing or adding HVAC equipment; and performance uncertainty regarding installations of high efficiency equipment.[16]

3. The average HVAC contractor's company tends to be a small operation with little time and resources available to become informed and/or trained on new technologies and practices. All training classes should be developed with this information in mind.

4. HVAC contractors are interested in receiving clear-cut information describing the benefits (comfort and cost) of energy-efficient equipment and practices. They want to know what equipment and practices are classified as energy-efficient and what exactly the benefits are that

[15] Op. Cit. (8), section VI, pages 62-63.

customers will receive from energy-efficient equipment. The HVAC contractors feel that providing information on how energy efficiency affects comfort levels, more so than long-term financial savings, would be a useful emphasis. This would equip them with the information needed to advocate energy-efficient solutions to their customers.

5. It is recommended that PG&E coordinate classes with industry organizations such as the Consortium for Energy Efficiency (specifically their program on HVAC Quality Installation Practice), Air Conditioning Contractors of America (ACCA), and the Refrigerator Service Engineers Society (RSES)[17] so that training is given more visibility with contractors. It is also recommended that PG&E work with these organizations to encourage the development of an independent industry certification infrastructure, including the development of installation standards and installer certification programs. These programs could be developed with the goal of reducing costs associated with callbacks, improving the number of installers and the level of their competency, and improvement of the overall quality of installations of energy-efficient products.

6. Any training about the technical side of HVAC should include variations according to climate zones. This is especially true for HVAC. PG&E's service territory is unique in that it covers a variety of climate zones with considerably different attributes and energy efficiency concerns. For example, HVAC contractors working in the San Joaquin Valley would have a strong interest in air conditioning training, but those

[16] Op. Cit. (8), section V, page 38, and section IX, page 33.
[17] Ibid., section IX, page 30.

in the coastal area would be interested in a class with a different emphasis.

7. Performance testing, though not frequently provided by HVAC contractors, may offer another avenue for training. Performance testing takes place when the contractor, using diagnostic tools (i.e., airflow measurement devices, duct leakage testers) shows the customer that the work has been done properly. These tools may also be used to show the direct benefits the homeowner's choice is now having on the home. PG&E might want to offer training on performance evaluation, or promote more economically viable ways to show to the customer the direct benefits of the newly installed, energy-efficient HVAC system.
8. HVAC contractors expressed a strong interest in augmenting training with mailings to keep them up to date about emerging energy-efficient technologies. One reason for the lack of well-qualified contractors in the market has to do with the rapid changes in what is considered energy-efficient technology and how the changes affect their work. Mailing updates, perhaps organized with an existing newsletter, would be of great use, they said. These updates could also be an excellent marketing tool for offering future training classes, as they become available.
9. Classes on the Title 24 requirements as they pertain to HVAC would be useful to the HVAC contractors. They may also be interested in a class that specifically focuses on the recent Title 24 changes and the implications for HVAC contractors. They were specifically interested in how to deal with building inspectors and meeting inspection requirements for Title 24.

10. HVAC contractors were also interested in instruction that would allow them to get more face time with the customer in situations where they were sub-contracting. HVAC contractors were interested in obtaining information that would give them more access to the customer to explain the energy efficiency options available. This would best be treated as a marketing issue, and the class could perhaps include a summary of various marketing training, treating this problem as one aspect of the class or workshop.

Window Contractors

Market Size

It is estimated that there are 830 window contractors is PG&E's service territory.[18]

Role

Window contractors replace windows in existing homes (when no other work is being done), or install new windows during broader remodeling projects. Window replacement is the most frequent single discretionary retrofit event.[19] Homeowners frequently replace their existing windows without undertaking any other retrofits or renovations. While some general contractors offer window replacement services, there are large numbers of contractors who specialize in windows.[20] Correspondingly, a large amount of the retrofit and renovation work including windows is not channeled through general contractors.

Knowledge about energy efficiency is fairly common among window contractors. As with the other market actors, window contractors do not see energy efficiency as a chief concern of their customers. Style, reliability, and price are the prime motivating factors for customers.[21] As with HVAC contractors, specialized window contractors have a better understanding of

[18] Op. Cit. (2).
[19] Op. Cit. (11), page 3-2.
[20] Ibid., page 3-16.
[21] Ibid., page 3-15.

energy efficiency than general contractors and are more likely to discuss it with their customers when they are dealing with them directly.

Training Opportunities

1. A class designed to train contractors to present the benefits of energy-efficient windows should be offered. Trade magazines were also cited as an effective way to get information to window contractors.[22] Comfort is often overlooked when homeowners are shopping for new windows. Consumers normally consider aesthetics and price before comfort. If window contractors were better equipped to communicate the impacts of window performance on comfort, deterioration of products in their home and long-term economic savings, they could relay this information to homeowners and offer more energy-efficient options during the decision making process. Classes should emphasize comfort and quality of life issues, such as reduced UV light and ability to incorporate more windows in a home when using energy-efficient products. Long-term financial savings to the customer and marketing tools for the window contractor could also be incorporated into this class.
2. As with HVAC contractors, it is recommended that PG&E coordinate classes with industry-accepted window organizations, including trade magazines, to increase the visibility of any training programs offered. Working with organizations such as the American Architectural Manufacturers Association (AAMA) to develop industry accepted installation standards and installer certification programs would improve

energy-efficient window installation. This coordination should be done with the goal of reducing costs associated with callbacks, improve the number of installers and the level of their competency and improve the overall quality of installations of energy-efficient products.[23]

3. Training should be tailored to climate zones--window contractors on the coast vs. in the mountains have different needs and their customers have different concerns. This is pertinent for window contractors because the energy loss from their windows based on climate zone can vary greatly.[24]
4. Training should be tailored to small companies since a large majority of window contractor companies have fewer than 5 employees.[25]
5. There is a shortage of well-qualified window installers in the market, and classes to train on energy-efficient installation methods would prove useful.[26]

---

[22] 1998 - January, "Market Transformation: Residential Windows", prepared for PG&E by Opinion Dynamics Corp. Page 42.
[23] Ibid., page 52.
[24] Ibid., page 53.
[25] Op. Cit. (11), page 3-14.
[26] Op. Cit. (6).

Electrical (Lighting) Contractors

Market Size

It is estimated that there are 7,750 electrical contractors in PG&E's service territory.[27]

Role

General contractors usually sub-contract to electrical contractors when lighting changes are made. The literature indicates that electrical contractors generally are not concerned with energy efficiency when it comes to lighting. They do not believe it is an important consideration for customers, and are not inclined to discuss it with them.[28]

Training Opportunities

1. Training for these contractors should emphasize explaining energy-efficient products, such as those designated under the EnergyStar label, and encouraging electrical contractors to select and recommend these to their customers.

[27] Op. Cit. (2).
[28] Op. Cit. (11), page 6-14.

Retailers/Home Centers

Size

Of the major players in the retail home center market (i.e., Home Depot, Orchard Supply Hardware, Yardbirds, 84 Lumber and Meeks Lumber), there are approximately 120 home centers in PG&E's service territory.[29]

Role

Home centers are very large retail stores offering wide selections of building materials and remodeling and home maintenance tools. They are frequented by the major decision making parties involved in remodeling projects prior to and during remodeling projects. In addition to supplying basic materials used in construction, they are used by contractors to give homeowners a chance to view or shop for materials before purchase. Often, decisions about what equipment to purchase and therefore the extent to which energy efficiency will be incorporated into their home are made in these home centers. For the part of the market that does retrofit and renovations themselves -- the do-it-yourselfers -- this may be the only area where they can be informed about the energy efficiency of the equipment they are purchasing.

Home centers stock a considerable portion of the products used in the retrofit and renovation market under one roof. They have lumber, bolts, concrete, drywall, fixtures, flashing, building paper, windows, water heaters,

[29] Based on PG&E provided numbers.

insulation and other necessary equipment. Consequently, most of the decision-makers involved in a remodeling project will visit one of these stores at least once during the project. Therefore, these stores potentially provide an almost ideal opportunity to communicate information about energy efficiency to critical parties in the investment decision making process before and during the remodeling effort.

Sales personnel in home centers see energy efficiency as a limited concern for their customers. Instead, they say their customers view price, reliability, style, and product reputation as more important.[30] Presently, home center retailers don't market or push energy-efficient products because they don't perceive much customer interest. The one product exception appears to be windows.[31] Some home centers, like Home Depot, have enthusiastically participated in window training programs for their employees and customers. Based on the responses of customers and employees to this training program there may be opportunities for other product training classes -- specifically water heaters.[32]

Unlike the other market actors, who sell up at the risk of losing a project or appearing to unnecessarily inflate costs, retailers make profits based on selling high value and high margin products. They have a natural strong economic incentive to sell up.

[30] Op. Cit. (11), page 5-8.
[31] Based on an interview with training specialist James O'Bannon.
[32] Ibid.

Although it appears home centers also are uniquely qualified to promote the whole-house approach to remodeling, they appear to be unlikely to do so.[33] Home centers are heavily departmentalized, and there is a general lack of cross-departmental sales expertise. One area expert believes that the lack of cross-departmental training among sales staff members would result in constant shuffling from sales person to sales person and thus produce significant frustration for homeowners trying to use the whole-house approach in a home center environment. It also is unlikely that the home centers would cross-train sales staff in the whole-house approach because it would present a restructuring problem which they have no incentive to solve.[34]

Training Opportunities

1. Retail sales staffs in home centers should be trained about energy-efficient options and equipment, especially windows (which PG&E already has been working on), and water heaters. Home centers are open to bringing in energy efficiency specialists to keep their staff up-to-date on industry changes and specifics. Currently, PG&E has consultants involved as guest lecturers during in-store training for windows. This training has been successful and should be continued and broadened. Stores like Home Depot, in fact, pride themselves on equipment knowledge and seem receptive to working with PG&E on training. These classes dealing with energy efficiency technologies and alternatives might best be offered on-site at various home centers, so that

[33] Op. Cit. (31).

customers could also be brought into the process. The windows training that PG&E has already been involved with Home Depot has actually influenced the types (i.e. more energy-efficient) of products they stock on their shelves. In this instance, PG&E's training has significantly impacted this part of the market, and should continue to do so.[35] Training should include a detailed explanation of the EnergyStar® labeling system emphasizing the products in the store that are so labeled.[36]

2. "Roadshow" demonstrations can be offered to demonstrate new energy-efficient technologies to sales staff, homeowners, and contractors. This has already been very successful with windows. More of these events in PG&E's service territory are recommended. These demonstrations included vendor, customer, and contractor participation, and were comprised of seminars and demonstrations. These shows also represent marketing opportunities for energy efficiency and future training events. Water heaters were suggested as a candidate for future demonstrations.[37]

3. There is an opportunity to provide videotapes on energy-efficient technologies to be made available on the floor to staff and customers. These videotapes should explain how various energy-efficient technologies work, and what their various benefits are. This product should be developed with the do-it-yourselfers in mind, since they are most likely to find this appealing.[38]

---

[34] Op. Cit. (31).
[35] Ibid.
[36] Op. Cit. (11), page 5-8.
[37] Op. Cit. (31).
[38] Op. Cit. (11), page A-12.

Retailers/Specialty Shops

Market Size

There are an estimated 450 window and kitchen and bath specialty shops in PG&E's service territory.[39]

Role

Specialty retailers offer a more comprehensive selection of specific products or related products in the retrofit and renovation market than home centers. The majority of these specialty shops provide windows or kitchen and bath products and design services. Specialty window retailers reported discussing energy efficiency in most or all of their sales situations.[40] However, they also reported that energy efficiency wasn't of primary concern to their customers. Instead, price, style and reliability ranked highest. Kitchen and bath retailers cited the EnergyStar® label as a guide to energy efficiency.[41] These market actors are mostly interested in learning more about the products they are trying to sell, and how energy efficiency plays into their performance. A training format similar to the California Windows Initiative (CWI)[42] was recommended which includes attendance by, and therefore simultaneous training of, window contractors and customers.[43]

---

[39] Based on Standard Industrial Classification code numbers for retailers in kitchens, baths and windows.
[40] Op. Cit. (11), page 3-13.
[41] Ibid., page 5-18.
[42] The California Window Initiative (CWI) is a collaborative of window and building energy technology experts, administered by Richard Heath and Associates, Inc. The purpose of CWI is to transform the California window market to high-performance products through on-site specialized training. CWI is a result of a third party 1998 contract.
[43] Op. Cit (11), page A-12.

Training Opportunities

1. Classes could be offered on explaining the benefits and costs of energy efficient windows, and kitchen and bath products and design services.[44] Up selling means higher profits for their business. This class could also deal with new technologies and what is in the works, then sales staff could inform and give well-reasoned suggestions to their customers, which include homeowners and contractors. There should also be a component in this training to address those specialty retailers who install the windows they sell.
2. It is recommended that PG&E coordinate classes with industry-accepted organizations (i.e., Energy Efficiency Consortium, American Architectural Manufacturers Association) to increase the visibility of any training programs offered. This is especially true for window specialty shops. Working with organizations to develop industry accepted installation standards and installer certification programs would improve energy-efficient window installation. This coordination should be done with the goal of reducing costs associated with callbacks, improve the number of installers and the level of their competency and improve the overall quality of installations of energy-efficient products.[45]
3. "Roadshow" demonstrations can be offered to demonstrate new energy-efficient technologies to sales staff, homeowners, and contractors. This has already been done with windows with great success. More of these events in PG&E's service territory are recommended. These demonstrations included vendor, customer, and contractor participation,

[44] Op. Cit. (11), page A-12.

and were comprised of seminars and demonstrations. These shows also represent marketing opportunities for energy efficiency and future training events.[46]

4. There is an opportunity to provide videotapes on energy-efficient technologies to be made available on the floor to staff and customers. These videotapes should explain how various energy-efficient technologies work, and what their various benefits are. This should be developed with the do-it-yourselfers in mind, since they are most likely to find this appealing.[47]

5. Training should be offered on the EnergyStar label directed toward small business retailers, such as kitchen and bath specialty shops.[48]

[45] Op. Cit. (22), page 52.
[46] Op. Cit. (31).
[47] Op. Cit. (11), page A-12.
[48] Ibid., page 5-8.

Building Code Inspectors

Market Size

It is estimated that there are 1,800 building code inspectors in PG&E's service area.[49]

Role

Not all retrofits and renovations require a Title 24 inspection. For those that do, building code inspectors play an important role in energy efficiency.[50] Building code inspectors ensure that the plans and installations comply with Title 24 -- the section of California's building codes concerned with energy efficiency and proper installation practices. Title 24 contains specific recommendations for achieving the minimum energy efficiency requirements in homes. Building code inspectors are responsible for checking construction plans to ensure compliance with Title 24 and for inspecting additions or renovations to ensure that the Title 24 requirements and specifications in the construction plans were correctly followed.

Recent changes to the requirements in Title 24 have increased the level of technical expertise required to properly evaluate plans and installations.[51] These changes provide substantial incentive for jurisdictions and their

[49] Based on executive interviews with industry specialists Charles Segerstrom and Doug Beaman.
[50] Ibid.
[51] Ibid.

building code inspectors to receive additional training regarding the interpretation of Title 24 compliance.

Building code inspectors are also concerned with issues of health and safety. When reviewing a retrofit or renovation, they are likely to check for any health or safety hazards created as a result of the work completed.[52]

Training Opportunities

1. Training classes should be offered for plan checkers and building inspectors, coordinated with their local agencies, on Title 24 compliance. Classes should focus on:
    - how to inspect for Title 24 compliance,
    - how to ensure compliance with requirements established by recent changes to the code, and
    - proper installation practices for technologies covered by Title 24 (i.e., windows, insulation, HVAC system components).[53]
2. Building code inspectors are also interested in training on issues of health and safety. They would find a class about proper installation practices and techniques from the perspective health and safety to be useful.[54]

[52] Op. Cit. (49).
[53] Ibid.
[54] Ibid.

Energy Efficiency Mortgages (EEMs)

Introduction

EEMs bring together some specific market actors usually not involved in the Residential Retrofit and Renovation market. EEMs provide buyers with financing for the installation of energy efficiency measures at the time of a home sale, or in the event of refinancing. The measure costs are financed through the buyer's mortgage, and are paid off over the term of the loan. EEMs offer a motivation and method for financing the whole-house approach to retrofit and renovation. Currently, EEMs account for only a small part of the market. However, in the long run, they may become a more persuasive and influential force in the market. EEMs present a unique opportunity to finance the whole-house approach rather than just a single measure replacement. Once the potential homebuyer has decided to seek an EEM, they must then have a home energy rating done, which is often performed by a California Home Energy Efficiency Rating System (CHEERS) rater. As EEMs have become more common, "facilitators" have emerged as a new market actor. "Facilitators" coordinate the EEM with the various market actors.[55] The actors included in the EEM market are:

- Home Inspectors
- CHEERS Raters
- Lenders
- EEM "facilitators"
- Real Estate Agents

[55] 1998 – December, "Energy Aware Housing Agent Program: A Market Effects Study", prepared for PG&E by Schiller Associates.

EEM Market Actors

Home Inspectors

Market Size

It is estimated that there are over 750 home inspectors, including independent operators who do not belong to an association, in PG&E's service territory.[56]

Role

Home inspectors are involved in the time of sale part of the market, and are an advocate of the homebuyer. They evaluate the state of the home and make recommendations to the homebuyer regarding repairs and problems. Usually home inspectors do their inspection after it's too late to recommend an EEM. Home inspectors currently do not specifically offer energy efficiency services, and since there are no licensing requirements, there is no common system for training. Home inspectors will identify problems such as inadequate insulation or old equipment, but they currently do not offer comprehensive suggestions on how to increase energy efficiency.[57]

[56] Op. Cit. (49).
[57] Op. Cit. (11), page A-1.

Training Opportunities

1. Classes should be coordinated with California Real Estate Inspectors Association (CREIA) on both technical and business aspects of home inspection as it pertains to energy efficiency. This training should address some of the following areas: natural gas heating systems; combustion air and venting requirements, accessibility, installation, and maintenance; and electrical service equipment, such as AC, (particularly requirements for clearances and grounding).[58]
2. Considering the increase of home inspectors in the market, which stems from the lack of licensing requirements, home inspectors may be interested in offering services their competitors lack. PG&E could offer a course for home inspectors on how to provide an energy efficiency evaluation as a complementary, add-on service.[59] This course should include ways to market their services so that they are involved in the "sale" early enough to effect an EEM. If PG&E were to develop an energy efficiency evaluation training program, this could allow home inspectors to provide another service during their inspection, and give them a visible niche in the market. This training could be coordinated with some of the other actors in the EEM market so that they were recognized as energy efficiency specialists in the field.

[58] 1999 – July, "The Home Inspection Industry in the PG&E Service Area", prepared for PG&E by Richard Heath & Associates, pages 2, 3-4.
[59] Op. Cit. (11), page A-3.

CHEERS Raters

Market Size

There are over 60 CHEERS raters in PG&E's service territory.[60]

Role

State-certified California Home Energy Efficiency Rating System (CHEERS) raters offer the energy audit that is required by lenders in the process of getting an EEM. CHEERS raters perform a detailed analysis of the home checking for the energy efficiency level of insulation, windows, HVAC, water heater, and lighting. This information is then fed into a computer program that calculates the energy rating of the home, and provides recommendations for improvement and examples of the related costs and savings. CHEERS raters give detailed recommendations for increasing the energy efficiency of the home, often based on the homeowner's preferences and requirements.[61] However, CHEERS raters are prohibited from recommending brands or services to the homeowner since they must maintain an objective perspective. Several of the CHEERS raters expressed an interest in becoming EEM "facilitators". They feel they can provide better services and prices than the current "facilitators" can.[62]

[60] Op. Cit. (49).
[61] Ibid.
[62] Op. Cit. (11), pages 7-6 through 7-9.

Training Opportunities

1. CHEERS does all their rater's certification training in-house.[63] CHEERS raters can be a valuable tool in designing and implementing training classes for the other market actors. It would be especially useful to work with them to try and get general contractors on board as EEM "facilitators". They could also give valuable insight into the EEM process as a whole, and how to work toward the whole-house approach in the long run. PG&E could work with the CHEERS organization to develop additional cooperative training, or could extend PG&E training opportunities to CHEERS raters.

[63] Op. Cit. (6).

Lenders

Market Size

There are an estimated 760 lenders in PG&E's service territory.[64] It is important to note, however, that currently only a few regularly participate in the EEMs.[65]

Role

Lenders provide financing for EEMs. According to general contractors, the homeowners finance most non-EEM retrofit or renovations themselves, often through refinancing,.[66] Lenders are interested in energy efficiency only as it pertains to the EEMs. They do not see financing the whole-house approach as a viable option without EEMs.[67] They cited high information/search cost barriers as the primary concern. They also experience a high turnover rate among loan officers, which is a factor to consider when developing training programs.[68] According to CHEERS raters and "facilitators", a few lenders account for most of the EEMs being written.[69] "Facilitators", if they become more of a factor in the EEM market, can make the process easier on the lender, and therefore increase the interest and participation of this market actor. From the material presented, it was unclear if lenders were interested in becoming EEM "facilitators".

[64] Op. Cit. (2).
[65] Op. Cit., (11), page 7-11.
[66] Op. Cit. (1).
[67] Op. Cit. (11), page 7-11.
[68] Ibid.
[69] Ibid.

Training Opportunities

1. Loan officer training on EEMs is the chief training opportunity for this market actor.[70] This class should deal with the specifics of how to determine whether applicants are qualified for an EEM, the role of the CHEERS rater, and how to work effectively and in a timely manner with any "facilitators" in the process. There may also be room in this course to give training on the paperwork involved, and steps a prospective homeowner must go through in the EEM process.
2. PG&E could also provide training on marketing EEMs to potential customers.[71] As it stands, there are only a small number of EEMs getting written, and an even smaller number of lenders participating. This is due to lack of awareness of the long-term benefits of EEMs. Classes that offered lenders EEM marketing strategies to pull in more customers would prove useful to lenders.

[70] Op. Cit. (11), page A-11.
[71] Ibid.

EEM "facilitators"

Market Size

There are very few EEM "facilitators" officially in operation because this market actor is just emerging. PG&E estimates there are probably no more than 5 companies providing this service in their territory. [72]

Role

"Facilitators" generally handle the paperwork and coordinate the installation of energy-efficient measures. They can also hire and supervise contractors that do the recommended work, as well as oversee any other aspects of the process that may come up. Currently these "facilitators" are loosely defined in the market, and are not necessarily highly regarded by the other market actors working with EEMs. There are some concerns among market actors and contractors that EEM "facilitators" are less than candid about their profits and fees, and this has led to additional concerns about the appropriateness of recommendations made to customers and the costs of work done.[73]

[72] Op. Cit. (49).
[73] Ibid.

Training Opportunities

1. Since this is an emerging market actor, there is significant opportunity for training. A training class in what it means to be a "facilitator" and how to do it without damaging the EEM process is essential to the health and credibility of the EEM. This class could deal with sales training, the specifics of lender requirements, the role of home inspectors and CHEERS raters in the process, and how to work with contractors once the work is decided upon.[74]
2. General contractors expressed an interest in learning more about what is entailed in becoming an EEM "facilitators". A class addressed specifically to general contractors dealing with the process from their perspective could meet this need.[75] The general contractors in the focus group expressed a strong interest in learning more about EEMs, especially if there was an emphasis on the refinancing options available.[76] General contractors are also positioned to pursue and benefit from the whole-house approach using the EEM, and they expressed a serious interest in this whole-house approach. Training on the long term benefits, savings and comfort issues that a whole-house retrofit or renovation can mean for the homeowner will prove attractive to general contractors.

[74] Op. Cit. (49).
[75] Ibid.
[76] Op. Cit. (1).

Real Estate Agents

Market Size

It has been estimated that there are approximately 76,000 active real estate licenses in PG&E's service territory.[77]

Role

Real estate agents are involved in marketing homes for sale and representing buyers in search of homes. According to some of the EEM market actors, real estate agents see EEMs as a threat to the way they do business. Real estate agents are anxious to close deals and are concerned about anything that might derail them. One "facilitator" noted that real estate agents "hate the EEM program because they are afraid that if it is found that the home needs improvements, the customers will not be as willing to buy."[78] A further impediment to real estate interest is the booming real estate market which offers no incentive to find other ways to market homes. Some real estate agents have gone so far as to stop referring customers to lenders, and try to convince homebuyers *not* to use EEMs. Usually, real estate agents will bring up EEMs only in the event that it seems like it might help sell the home, for example if the homebuyer will purchase the home only if it has a new HVAC unit.[79]

[77] Op. Cit. (2).
[78] Op. Cit. (11), page 7-12.
[79] Ibid.

Training Opportunities

1. Until EEMs become a more powerful force in the market, real estate agents show only some interest in training. Informing real estate agents about the benefits of EEMs, and the importance of knowing about them in the event that the EEM might close a sale, seems to be the best opportunity for training. This training could be oriented toward the value-added aspects of selling energy-efficient homes.[80]

[80] Op. Cit. (11), page A-12.

Other Identified Market Actors

The following market actors have been identified as having opportunities for training, but are in need of further detailed research before these opportunities can be properly determined.

- Distributors
- Manufacturers
- Architects

Methods of Delivery

Many methods of delivery for training were suggested in the various reports, interviews and workshops conducted.

1. The most common training method considered was the standard classroom or seminar setting similar to what is currently offered at PG&E's training facilities in Stockton, Sonora, San Ramon and San Francisco. These settings offer all the benefits of classroom instruction. Concerning the classes, there was an general consensus that PG&E should:
    - coordinate its class with industry-accepted organizations and trade publications as much as possible;
    - coordinate classes with manufacturers and distributors who already have training programs in progress;
    - coordinate with technical schools and junior colleges; and
    - tailor the classes with climate zone considerations in mind.
2. The second most common method suggested was on-site training or seminars. This option was especially popular with the home centers, as they already have an in-house training program set up. Most of the market actors claimed a high volume of work based on the robust nature of the industry, so training that did not significantly cut into their work time proved attractive.
3. Another recommendation was that PG&E provide education on energy efficiency through videos that market actors can view at their own leisure. Several actors expressed an interest in this method of delivery to deal with constraints on their time. There was some skepticism with

other market actors, saying that video did not appeal to them because it didn't allow for specific questions to be asked and answered.

4. Several of the market actors, especially the contractors, were interested in keeping informed of changes in the market through direct mailings. This method could also keep them up-to-date on upcoming training classes or functions. There is a strong incentive in the market to remain competitive by keeping informed of the newest technologies. Information on the EnergyStar label should also be incorporated into these efforts.

5. Some market actors were interested in training classes and information resources offered through the Internet. This option was appealing due to time constraints and heavy workloads. The market actors felt that if they could learn at their own leisure, or during a time that worked best with their schedule, they would be more likely to participate in training.

6. There was some interest on the part of contractors to receive training on software applications that would allow them to demonstrate the comparative, long-term value of energy efficiency to their customers.

Section 3: Methodology

This report was developed by first reviewing the following literature provided by PG&E:

1999 – July, “The Home Inspection Industry in the PG&E Service Area”, prepared for PG&E by Richard Heath & Associates

1999 - June, "Residential Discretionary Retrofit and Time of Sale Renovation Market Characterization", prepared for PG&E by Quantum Consulting Inc.

1999 – June, "PG&E Comfort Home Program Market Baseline and Market Effects Study", prepared for PG&E by RER

1999 – June, “Residential Heating and Cooling Systems Program – Three Year Market Transformation Plan”, prepared by PG&E

1999 – May, Residential HVAC Market Transformation Market Characterization and Baseline Study", prepared for PG&E by Opinion Dynamics Corp.

1999 – April, "R&R Financing Options", prepared for PG&E by Applied Marketing Science

1999 – March, "PG&E Energy Efficiency Training Survey: Final Report", prepared for PG&E by Quantum Consulting Inc.

1998 – December, “Energy-Aware Housing Agent Program: A Market Effects Study”, prepared for PG&E by Schiller Associates

1998 – June, "PG&E Residential Energy Management Services Program: Market Baseline and Market Effects", prepared for PG&E by PHB Hagler Bailly, Inc.

1998 - January, "Market Transformation: Residential Windows", prepared for PG&E by Opinion Dynamics Corp.

1994 – April, "Pacific Gas and Electric Home Remodelers Study", prepared for PG&E by Market Strategies Inc.

During the review of these documents, the major market actors (building professionals) were identified; training opportunities were extracted and, market size was identified for each actor.

At the conclusion of the review, a presentation was prepared for PG&E’s “Residential Retrofit and Renovation Program Year 2000 Planning Public Input Workshop”. In this presentation, included as Appendix 2, findings concerning training opportunities and market size were given to the various market actors in attendance. Parties at the workshop included: general contractors, HVAC contractors, CHEERS Raters, PG&E program planners,

representatives from various departments of the state and federal governments and other California utilities. During the workshop, more detailed training suggestions were obtained from those present.

At the conclusion of the workshop, the findings of the study were summarized and important missing information identified. During this analysis, it became apparent that significant additional information was required concerning the information needs of general contractors, building inspectors and retailers.

To collect needed information from general contractors, a focus group was conducted in Walnut Creek on August 13, 1999 with 7 contractors representing companies of various size, specialty and location. The smallest contractor present had no other full-time employees, while the largest contractor employed at least 30. The moderator's discussion guide for this focus group, included as Appendix 4, solicited input from the general contractors on energy efficiency and their current perception of the market. Using the topical outline in the guide contractors were asked to discuss the training needs within specific subject matter areas. There was an enthusiastic, dynamic dialogue during this discussion, and several promising opportunities for training were identified.

Additional information about building code inspectors and retailers was obtained through executive interviews with industry specialists Charles Segerstrom and Doug Beaman to further explore training opportunities for home inspectors, building code inspectors, and issues of Title 24

compliance. An interview was also conducted with training specialist James O'Bannon on the retail sector of the market. FSC specifically asked what training had been done, or was currently being done, and how successful these programs were. Suggestions of other training options were also gathered.

Section 4: Appendices

- Appendix 1: Bibliography of reports
- Appendix 2: Presentation made to San Ramon Learning Center
- Appendix 3: Table of training opportunities made for discussion
- Appendix 4: Discussion guide for general contractor's focus group held in Walnut Creek, California

Appendix 1

Bibliography

1999 – July, “The Home Inspection Industry in the PG&E Service Area”, prepared for PG&E by Richard Heath & Associates

1999 - June, "Residential Discretionary Retrofit and Time of Sale Renovation Market Characterization", prepared for PG&E by Quantum Consulting Inc.

1999 – June, "PG&E Comfort Home Program Market Baseline and Market Effects Study", prepared for PG&E by RER

1999 – June, “Residential Heating and Cooling Systems Program – Three Year Market Transformation Plan”, prepared by PG&E

1999 – May, Residential HVAC Market Transformation Market Characterization and Baseline Study", prepared for PG&E by Opinion Dynamics Corp.

1999 – April, "R&R Financing Options", prepared for PG&E by Applied Marketing Science

1999 – March, "PG&E Energy Efficiency Training Survey: Final Report", prepared for PG&E by Quantum Consulting Inc.

1998 – December, “Energy-Aware Housing Agent Program: A Market Effects Study”, prepared for PG&E by Schiller Associates

1998 – June, "PG&E Residential Energy Management Services Program: Market Baseline and Market Effects", prepared for PG&E by PHB Hagler Bailly, Inc.

1998 - January, "Market Transformation: Residential Windows", prepared for PG&E by Opinion Dynamics Corp.

1994 – April, "Pacific Gas and Electric Home Remodelers Study", prepared for PG&E by Market Strategies Inc.

Appendix 2

Presentation made at PG&E's San Ramon Learning Center on July, 27, 1999 for the Residential Retrofit and Renovation Program Year 2000 Planning Public Input Workshop.

Appendix 3

Matrix of training opportunities extracted from studies provided by PG&E. This matrix was used for preliminary discussions with PG&E program coordinators and evaluators.

Appendix 4

Discussion guide for a focus group held with 7 general contractors in Walnut Creek on August 13, 1999.

Residential Retrofit Market Training Needs Assessment

Market Size and Training Opportunities

Freeman, Sullivan & Co.

Objectives

- **Milestone: Estimate the size of market for building professionals and identify opportunities for training.**
- **Based on reports given to PG&E, we will:**
  - Define role played by each market actor
  - Estimate size
  - Review training opportunities and suggestions

Overview - The Market

- **The Homeowner is the key market actor.**
- **Homeowners usually don't retrofit their homes with energy efficiency in mind.**
  - The climate and relative low cost offer little incentive.
  - There is more interest in expanding space or upgrading equipment.
- **Homeowners usually don't retrofit their home using a whole-house approach.**
- **Homeowners usually pay cash or already raised financing for specific expansions or upgrades.**

Overview - DR vs. TOS Renovations

- **Discretionary Retrofitting (DR) is retrofitting done by a homeowner.**
- **Do-it-yourselfers account for about 27 percent of the market.**
- **General or measure-specific contractors handle the rest.**
- **Time of Sale (TOS) renovations are made by the homeowner/homebuyer upon purchase.**

Structure of Training Opportunities

- **To understand the best opportunities for training, the market has been divided up into:**
  - Contractors (general & measure-specific)
  - Retailers (home centers & specialty shops)
  - EEM “facilitators”(small part of the market)
  - Home Inspectors
- **Both contractors and retailers directly influence EE decision-making.**

Contractors

- **General Contractors**

Window Contractors

HVAC Contractors

Electrical Contractors

General Contractors/ Role & Size

- **GCs do multi-faceted retrofitting like kitchen or bathroom remodeling.**
- **They often subcontract aspects of this, such as HVAC or electrical, to measure-specific contractors.**
- **There are around 98,240 general contractors in California.**
- **GCs don't see energy efficiency as important to remodeling customers.**

General Contractors/ Role & Size

- **GCs account for about one-third of the kitchen appliances ultimately sold to consumers in the remodeling market.**
- **An average of 46 percent of their jobs in existing homes include replacement of HVAC equipment.**
- **GCs have a less accurate understanding of energy-efficient characteristics of HVAC and windows than do measure-specific contractors.**
- **There is a limited awareness of energy efficiency among kitchen remodeling contractors.**

General Contractors Training Opportunities

- **GCs believe their customers see energy efficiency as only "somewhat important".**
- **Some training suggestions included:**
  - Offer information packets
  - Offer training seminars/classes
  - On-site training
  - Workshops
  - Certification program for contractors and subcontractors

Contractors

General Contractors

- **Window Contractors**

HVAC Contractors

Electrical Contractors

Window Contractors Role & Size

- **Window contractors can be hired directly by the homeowner, or subcontracted by general contractor.**
- **There are around 2,194 contractors state-wide who specialize in windows.**
- **Most window installation contractors give customers the choice of various window brands' efficiency level.**
- **Most window installation and remodeling contractors said that the type of windows they install is principally driven by the customer's budget.**

Window Contractors Role & Size

- **Window retailers report selling to both contractors and homeowners.**
- **Price, reliability, style, and warranty were cited as most important purchase criteria by all contractors.**
- **There appears to be a shortage of qualified, well-training window contractors in the market.**

Window Contractors Training Opportunities

- **Window contractors are generally knowledgeable about EE, but they feel there is still a general lack of information in the market.**
- **Contractors suggested using direct mailings or trade magazines to get out more information.**
- **Due to the small size of window contracting businesses, many window contractors will not send employees to training seminars.**

Windows Contractors Training Opportunities

- **Contractors said any direct training of windows contractors should emphasize:**
  - Added value and increased profit margins of high performance windows
  - Installation of high performance windows will reduce household energy use
  - Customers can incorporate more windows into a home
  - Use increased comfort and reduced ultra-violet degradation as selling points

Contractors

General Contractors

Window Contractors

- HVAC Contractors

Electrical Contractors

HVAC Contractors Role & Size

- HVAC systems are often subcontracted by GCs.
- Most HVAC contractors mention “low operating costs/lower utility bills” when talking with customers about high-efficiency equipment.
- There are around 9,421 HVAC contractors in California.
- HVAC contractors are wary of trying to upsell.
- There is a shortage of qualified, well-trained HVAC contractors in the market.

HVAC Contractors Role & Size

- **Customers frequently take the contractor's advice on what HVAC equipment to have installed.**
- **HVAC contractor's education and recommendations have the largest impact on this component of the DR market.**
- **Contractors indicate that "equipment reliability" and "contractor reputation" are the most important factors for customers making an HVAC purchase.**
- **EE is ranked as the sixth most important factor in customers' equipment purchase.**

HVAC Contractors Training Opportunities

- **HVAC Certification would provide recognition of EE qualifications.**
- **Technical training regarding system sizing.**
- **There was high interest in central air conditioning efficiency improvement.**
- **There was more participation in the Home Energy Savings Loan Program than any of the other PG&E programs mentioned.**

Contractors

General Contractors

Window Contractors

HVAC Contractors

- Electrical Contractors

Electrical (Lighting) Contractors Role & Size

- **Electrical contractors account for the majority of the retrofit lighting installations.**
- **There are around 20,373 electrical contractors in California.**
- **Electrical contractors are a small part of the market.**
- **Electrical contractors don't promote efficient lighting technologies because customers do not have much interest in EE.**

Electrical (Lighting) Contractors Training Opportunities

- **In the reports provided, electrical contractors were not asked to give training suggestions.**
- **Evidence suggests electrical contractors influence only a small part of the market.**

Retailers

Retailers/Role & Size

- Retailers are the primary conduit through which the DR or TOS renovation equipment passes.
- The input of the sales person and their knowledge of EE is essential.
- Unlike the other market actors, retailers have a strong incentive to sell up.
- Retailers are divided up into large home centers and specialty shops.

Retailers/Role & Size

- **Home Centers**
  - There are around 120 home center retailers in PG&E's service territory.
  - Home centers don't see EE as a large concern for their customers.
  - Home centers see integrated solutions as playing to their strength.
  - They've been receptive to training and information-based interventions.
  - Retailers see higher profit margins as an incentive to sell EE equipment.

Retailers/Role & Size

- **Specialty Shops**
  - Specialty shops allow customers to come in and look at various products in the market.
    - Kitchens and Baths
    - Windows
  - These shops are becoming more popular.

Retailers/Training Opportunities

- **Provide video tapes to home centers so that their customers can watch EE demonstrations.**
- **These video monitors are often already in place for do-it-yourselfers.**
- **A specialty window retailer suggested a training format similar to the California Windows Initiative program.**
- **Self-education provided over the Internet would be helpful.**
- **Offer on-site training.**

EEM “Facilitators”

Energy Efficiency Mortgages (EEMs)

- **EEMs offer a unique incentive to renovate a home at the time of sale.**
- **They are still a relatively small portion of the market.**
- **Quantum Consulting estimates that there about 2,000 EEMs written annually in PG&E's service territory.**
- **EEMs remain low for TOS customers.**
- **The cost of the prerequisite CHEERS analysis may discourage customers.**

CHEERS Raters

- California Home Energy Efficiency Rating Program (CHEERS) offer specific recommendations on how to increase EE in the home.
- EEMs require a rating like this to be done prior to the financing process.
- Adding insulation or replacing windows is a common recommendation.
- Some CHEERS raters are considering becoming facilitators.
- There are 42 CHEERS raters in California.

Lenders

- **Lenders are primarily used when getting an EEM.**
- **Lenders say it is difficult to provide loans outside the EEM framework.**
- **There are about 2,000 lenders in California.**

Realtors

- **“Realtors hate the EEM program because they are afraid if it is found that the home needs improvements, the customers will not be as willing to buy.”**
- **Realtors are anxious to close a deal and more suspicious of anything that might derail it.**
- **The booming California real estate market doesn’t offer much of an economic incentive to push EEMs.**
- **There are around 200,000 realtors in California.**

EEM "Facilitators" Training Opportunities

- **Provide loan officer training on how to promote EEMs.**
- **Offer guidelines to determine qualified applicants.**
- **Better explanation of the incentives for EE equipment.**

Home Inspectors/ Role & Size

- **Home inspectors appear to have good general knowledge of EE issues.**
- **There are about 782 home inspectors in California.**
- **Not all inspectors know how to conduct a compete Title 24 review.**
- **Not all of them can keep up with changes in the codes.**

Home Inspectors Training Opportunities

- **Training on how to offer energy audits as an add-on service.**
- **Offer certification process.**
- **Classes on how to develop new lines of business.**

Best Training Opportunities

- **Getting GCs more involved in EE.**
- **Retailers have incentive to sell up.**
- **Retailers are a common point of contact in the market**

Best Training Opportunities

- **Measure-specific contractors are the most knowledgeable.**
- **Access to information is a main concern of all market actors.**
- **EEMs are not yet a significant market actor.**

Audience Input

- **Contractors, retailers, EEM facilitators, and home inspectors.**
- **Suggestions given:**
  - **On-site training/workshops**
  - **Certification**
  - **Access to information**
  - **School training**
- ***What are some specific training suggestions?***

Market Actor	Size	Training Opportunities	Classes Offered at Stockton Training Ctr.
General Contractors	37,000	• Communicate the potential market advantages of positioning themselves as experts in energy efficiency to GCs. Can be an important selling point. Benefits that can be obtained from incorporating optional EE upgrades in proposals. • Classes on the Title 24 changes and the implications for businesses. • Classes on the benefits of becoming EEM facilitators. • Educate GCs about HVAC contractors and the contribution they can make to improve EE in a home -- other benefits of using a qualified HVAC installer. • Offer correspondence courses; this could be coupled with above renewal requirements. • Offer training classes that directly lead to certification; incorporate EE in the classes. • Offer regional training classes emphasizing EE opportunities in different applications and climates. • Provide training in Title 24 compliance -- what the requirements are, how EE is involved and how going beyond Title 24 can benefit them and their customers. • Deliver education on EE through videos contractors can view at home at their own leisure. • Provide information on the benefits (economics, comfort, health and safety) of building with EE in mind. • Provide information and aids in how to market EE in different bidding situations. • Implement mailing lists to keep interested contractors up to date on availability of training. • Provide software to be used on laptop computers to demonstrate the comparative, long-term value of EE to customers. • Inform GCs using direct mailing or other marketing of the meaning and importance of the EnergyStar label. • Offer training classes, certification tests over the Internet. • Classes on the Title 24 changes and the implications for businesses.	• RCP – Duct overview • RCP –CAS overview • RCP – Windows overview • RCP – Walls overview • RCP – Duct/CAS Challenge exam • EE Water Measures • RCP for CIP

Market Actor	Size	Training Opportunities	Classes Offered at Stockton Training Ctr.
HVAC Contractors	1,200	• Provide information on the benefits (economics, comfort, health and safety) of EE in HVAC applications. • Provide information and aids in how to market EE in different bidding situations. • Implement mailing lists to keep interested contractors up to date on the availability of training. • Provide software to be used on laptop computers to demonstrate the comparative, long-term value of EE to customers. • Inform HVAC contractors using direct mailing or other marketing of the meaning and importance of the EnergyStar label. • Offer training classes, certification tests on the Internet. • Offer training classes in duct sizing and duct sealing. • Provide regional training in HVAC topics -- air conditioning is big issue in the Central Valley, not in Monterey. • Coordinate training with manufacturers and distributors who already have training programs in progress. • Training should be tailored to small companies. • Provide on-site training whenever possible. • Coordinate training in energy efficiency with technical schools where possible. • Provide education on EE through videos that contractors can view at home at their own leisure. • Provide instruction in the use of performance testing, so contractors can show their customer that the work has been done correctly. • Coordinate with schools to bring more contractors into the labor force. • Classes on the Title 24 changes and the implications for businesses.	• T-24 Equipment sizing & selection. • T-24 Installation standards.

Market Actor	Size	Training Opportunities	Classes Offered at Stockton Training Ctr.
Window Contractors	830	• Provide information on the benefits (economics, comfort, ability to incorporate more windows reduced UV light). • Provide regional training --window contractors on the coast vs. in the Sierras have different needs and their customers different concerns. • Implement mailing lists to keep window contractors informed of available training. • Inform Window contractors using direct mailing or other marketing of the meaning and importance of the EnergyStar label. • Coordinate with schools to bring more contractors into the labor force. • Offer training classes, certification tests over the Internet.	• RCP – Windows overview
Electrical Contractors	7,750	• Inform contractors using direct mailing or other marketing of the meaning and importance of the EnergyStar label.	

Market Actor	Size	Training Opportunities	Classes Offered at Stockton Training Ctr.
Retailers - Home Centers	120	• Provide videos to be made available on the floor explaining how various EE technologies work and how they benefit consumers. • Inform retail staff of the EnergyStar technologies and the reasons/advantages of the label. • Train retail staff on EE alternatives and technologies. • Train retail staff on whole-house approach to remodeling. • Provide self-education classes in EE over the Internet.	
Retailers - Specialty Shops		• Provide training classes for specific technologies on how to upsell customers to EE technologies, and the advantages of these items to their home.	
EEM "Facilitators"	5	• Offer classes on what an EEM facilitator does. • Marketing EEMs.	
Home Inspectors	450	• Offer a course on how to provide energy audits as an add-on service. • Value-added service, with EEMs, offering a niche in the market. • Provide training concerning how to provide a Title 24 review, and the new changes. • Provide information on on code changes and energy efficiency by direct mailings. • Coordinate classes with CREIA on both technical and business aspects of the field. This training should be in the form of seminars and workshops and could address some of the following areas: natural gas heating systems; combustion air and venting requirements, accessibility, installation, and maintenance; and electrical service equipment, such as AC, (particularly requirements for clearances and grounding).	• T-24 Air Distribution Diagnostic Training • Home Inspector Training
CHEERS Raters	42	• They have their own training programs and when asked they responded that their training needs were met.	• CHEERS
Realtors	76,000	• Provide general information about the economic and social benefits of EE renovations.	
Lenders	760	• Provide loan officer training specifically geared toward EEMs. • Provide a class in how to market EEMs to their customers.	
Customers		• Public Service Announcements directed toward children: "Don't be an energy hog".	

General Contractor Focus Group

Residential Retrofit

& Renovation Market

Breakfast, Introductions and Explanation of Objectives

Energy Efficiency and the Market

- What do your customers think about energy efficiency?
  - Do they care about it?
  - Are they willing to pay for it?
  - Do they look to you for advice?
  - What do you say?
- Do you have strategic alliances with vendors and sub-contractors?
  - what areas
  - what do they provide?

Energy Efficiency and the Market

<u>When Bidding to specifications</u>

- Is there a market advantage to positioning yourselves as experts in energy efficiency?
- Can this can be an important selling point?
- What is the feasibility of incorporating optional EE upgrades in proposals?

<u>When doing Design and Build</u>

- How is energy efficiency of design determined?

Subcontractors

- How often do you use sub-contractors
  - HVAC
  - Windows
  - Electrical
  - Plumbing
- How do you select sub-contractors?
  - sole source v. bidding to specifications
  - is there an opportunity for them to sell-up to you?
- How can they communicate the specific advantages/disadvantages of the equipment they are installing?

Title 24 Issues

- How knowledgeable are you on Title 24 and the recent changes?
- What is your strategy for dealing with Title 24 compliance?
- What are the implications of Title 24 changes for your business?
- Are you interested in training dealing with
  - Title 24 basics
  - how you can use alternative approaches to Title 24 to benefit you and your customers?
- What's the best way?

Possible Areas of Training

- Title 24 compliance
  - explaining recent changes to Title 24
  - emphasizing Title 24 issues that will occur in different climate zones?
  - explaining alternative approaches to achieving compliance?
- The benefits of building with energy efficiency in mind?
  - comfort
  - operating cost
  - health and safety
- Using Energy Efficiency Competitively?

Other Possible Training Issues

- Energy Star Marketing Program
- Whole House Approach To Energy Efficiency
- Energy Efficient Mortgages
- What else?

What’s the best way to get information to you?

- Articles in trades
- Video tapes
- Internet
- Books on tape
- Correspondence courses
- Classroom courses