*Report of the Residential Contractor Program Evaluation*

*Volume I*

# Phase I Residential Contractor Program Market Assessment

***Prepared for:***
California Board for Energy Efficiency (CBEE)
Pacific Gas & Electric (PG&E)

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# Work Completed as Part of the Report of the Residential Contractor Program Evaluation



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# Executive Summary

## *1. Overview & Purpose*

This report provides a summary of work that has been undertaken to characterize the residential retrofit contractor market and the role that such contractors play in the selection, installation, and maintenance of energy-related products and services. This report is intended to provide interested parties with a concise, and yet detailed, characterization of the residential retrofit contractor market, including quantitative estimates of how many contractors are involved in each of the relevant markets, and qualitative information on relevant business trends within each contractor segment. As such, the report provides information relevant to the planning and evaluation of the Residential Contractor Program (RCP) being implemented throughout the state of California to foster increased adoption of energy efficient practices in residential retrofit markets.

Residential contractors play a significant role in the design and specification of residential retrofit and renovation projects, including a number of types of projects that provide opportunities for capturing increased levels of energy efficiency. Although the do-it-yourself market is large, many households rely on contractors for advice and services related to major energy uses in their homes. This is necessary because, larger energy consuming equipment in the home requires relatively infrequent maintenance and replacement. As a result, few consumers take the time, or see the need, to become technically versed in equipment options and operational details. Recognizing energy efficiency opportunities among the multitude of choices is plainly difficult, even for the experienced technician. Thus it is often left to the contractor to choose or advise the consumer on decisions related to replacing existing equipment.

## *2. Research Overview*

This project was commissioned by the California Board for Energy Efficiency and managed by Pacific Gas and Electric. The objectives of the overall project were to:

- Investigate contractor certification practices across the nation;

- Develop estimates of the number of contractors offering energy efficiency services to the residential retrofit marketplace in California;
- Characterize the barriers which impede greater use of energy efficient products and practices in the marketplace;
- Provide recommendations for the 1999 Residential Contractor Program ( PY99 RCP); and
- Develop statewide baseline data on residential retrofit practices and market characteristics of contractors serving existing homes in California.

Research tasks that contributed to this report are summarized in Table ES-1 below.

**Table ES-1: Summary of Research Tasks**

| Task | Focus | Timeframe |
|---|---|---|
| Review of certification issues | Collect and assess information on various organizations offering certification of contractors | Fourth quarter 1998 |
| Literature review | Synthesize existing information on relevant market barriers and identify areas needing further research | First quarter 1999 |
| Analysis of state licensing records | Develop an improved understanding of the market's structure and estimate the size of the residential retrofit contractor population | Second quarter 1999 |
| Qualitative interviews with 50 contractors | Exploratory research on key topic areas for developing preliminary insights and informing the design of the baseline survey | Third quarter 1998; second quarter 1999 |
| Baseline survey with 444 contractors doing work in the existing residential sector | Characterize market practices in equipment procurement, marketing and specification; profile contractor population; identify perceived barriers to energy efficiency; and track program awareness and participation in Residential Contractor Program | Third-fourth quarters 1999 |

### *3. Estimated Size of the Residential Contracting Market*

With more than 11,827,000 housing units in California in 1996[1], the potential market for energy efficiency appears to be inexhaustible. In actuality, the potential may vary significantly from one segment to another. In 1990, there were 550,000 mobile homes, 6,100,000 single-detached homes, 1,800,000 duplex, triplex, and quads, and 2,600,000 multifamily units. These numbers alone indicate significant differences in market potential from one housing type segment to another.

Table ES-2 shows our estimate of the actual number of contractors working in the residential market, both single-family and multifamily, in California for five key contracting specialties relating to energy efficiency opportunities addressed by RCP.

**Table ES-2: Estimated Residential Contractor Population in California in 1998**

| CSLB License Class | Number of Firms Listed in CSLB as "Active Licenses" | Proportion Confirmed as Still in Business [2] | % Providing Residential Retrofit Services [3] | Total # Active Contractors in Residential Retrofit Market |
|---|---|---|---|---|
| C-2 Insulation | 1,180 | 80 % | 15 % | 142 |
| C-20 HVAC | 7,206 | 65 % | 37 % | 1,733 |
| C-17 Glazing / Windows | 2,493 | 90 % | 48 % | 1,077 |
| C-10 Electrical | 17,426 | 80 % | 18 % | 2,509 |
| B General Contracting | 90,889 | 45 % | 17 % | 6,953 |
| Total contractors: | 119,194 | | | 12,414 |

[1] 1996 estimate, Population Estimates Program, Population Division, U.S. Bureau of the Census. US. Census Bureau; *Historical Census of Housing Tables: Units in Structure*, 1990 Decennial Census, Downloaded from Website 9/17/99.

[2] As a result of business turnover and the practice of renewing licenses even when a contractor has little or no current business, the CSLB data overstates the number of active businesses. The existence of a working phone number was used as an indicator of real presence in the marketplace.

[3] Percentages based upon data collected through telephone surveys conducted in 1999. Excludes contractors reporting that they work exclusively in the commercial or industrial sector in residential new construction only.

Additional analyses of these records was undertaken to examine the degree to which contractors tend to carry multiple licenses, potentially permitting their firms to provide an array of efficiency services in the residential sector. The findings indicated that, among contractors licensed in the above specialties, there was a low to moderate amount of cross-licensing. Importantly, there were very few contractors holding a sufficient range of licenses to allow them to practice whole-house retrofits. Fewer than 2% of the contractors in the Baseline Study provide whole house services. The residential contracting market is characterized by a predominance of specialists rather than generalists, with pronounced fragmentation in the delivery of contracting services across the licensed trades. For consumers then, it is likely that whole house retrofits will, more often than not, involve the work of multiple contractors on any given job.

### *4. Market Barriers Common across Residential Retrofit Contracting Trades*

In developing policy initiatives aimed at transforming the market for energy efficiency in the residential sector, it is valuable for policymakers to understand and identify the market barriers that inhibit the attainment of a greater level of energy efficiency within the existing residential contracting marketplace.

Barriers, or challenges, that are common across all residential retrofit contracting trades in the California market include (1) lack of consumer interest, (2) a low level of consumer awareness, (3) a tight housing market, (4) a tight job market, (5) a relatively mild climate, and (6) contractor inertia or lack of interest in changing current business practices.

Table ES-3 summarizes the results from the Contractor Baseline Survey documenting barriers perceived by contractors. Interestingly cost factors are the largest perceived barrier for HVAC and windows, while lack of consumer demand is the primary barrier for all other areas.

**Table ES-3: Factors Preventing Contractors from Installing More Energy Efficient Equipment and Services**
**(Percentage of Contractors Mentioning Factor)**

| Barriers | HVAC | Ducts | Windows | Insulation | Weatherization | Lighting |
|---|---|---|---|---|---|---|
| Lack of consumer demand | 14% | 42% | 12% | 35% | 35% | 47% |
| Cost of the system or unfavorable economics | 45% | 14% | 32% | 26% | 13% | 21% |
| Equipment availability | 5% | 1% | 4% | 0% | 13% | 7% |
| Equipment reliability and performance problems | 3% | 1% | 1% | 0% | 6% | 4% |
| My firm is not in a position to provide these services | 3% | 19% | 5% | 26% | 30% | 1% |
| Something else | 1% | 3% | 1% | 4% | 0% | 2% |
| There are no factors | 0% | 0% | 45% | 8% | 6% | 20% |

### *5. Summary of Significant Findings and Recommendations*

As noted throughout this report, residential contractors play an important role in installing and maintaining building shell components, furnaces, air conditioners, water heaters, and lighting. Encouraging these contractors to promote and utilize more energy efficient products and practices is a logical approach. The design of the CBEE Residential Contractor Program concept, focusing on contractors to transform the market for energy efficiency in existing housing, reflects this concept.

While much of the information provided in this report is intended to serve as background information for program designers and policy makers seeking to understand the residential contracting market in greater detail, there are several significant findings and recommendations that are worth highlighting. To the extent that future energy efficiency

initiatives that involve the residential contracting market can reflect these findings and recommendations, efforts to leverage this important market will be much more successful.

Significant findings from this study that should be borne in mind as policymakers and others endeavor to influence the residential contracting market are noted below. Based upon each significant finding, we provide our recommendations for policymakers interested in addressing energy efficiency issues in the residential contracting market.

### Low Consumer Demand

- ***Finding: Consumer demand for efficient products and services in the residential contracting market is low.***

- ***Recommendation: Develop and implement an aggressive marketing campaign to increase consumer awareness of energy efficiency opportunities related to the use of residential contractors.***

  Incentives alone are unlikely to be sufficient to transform the residential contracting market. Contractors have cited low consumer demand for energy efficient products and services as a barrier to undertaking more work in this area. Similarly, CBEE-sponsored research has documented an extremely low level of awareness among consumers. And yet, at the same time, consumers report that they feel they are relatively informed in areas of energy efficiency opportunities. Clearly, if any policy initiatives are going to succeed in this market, it is necessary to first undertake broad-based efforts to educate and challenge consumers to find out if they really have as good of an understanding of energy efficiency options as they believe they have.

### Diversity of Contracting Markets

- ***Finding: Residential contracting markets are extremely diverse and fragmented, both in scope and business practices.***

- ***Recommendation: On-going market research should be undertaken to understand the diverse array of contracting markets and practices.***

It is important for everyone to understand that market transformation within the residential contracting market requires a different focus and strategy than did previous DSM programs designed to acquire resources. The success of RCP and other initiatives in this market will depend on the ability of program planners to understand these markets and develop creative ways to work with contractors and their customers.

### Limited Reach of Current RCP Initiative

- ***Finding: The current RCP design is likely to reach only limited portions of the market and take considerable time to transform the residential contracting market, thereby necessitating additional program initiatives to address the complete market.***

- ***Recommendation: Expand current initiatives to educate and train a broad array of residential contractors and motivate business owners.***

Awareness and understanding of specific benefits of higher efficiency products among the broad residential contracting market is quite low. Current efforts to train contractors in areas promoted by the RCP are valuable. These efforts have so far only reached a small segment of the contractor marketplace. RCP should expand its efforts in training to reach the broader contractor market as well. This will likely require a variety of training approaches coupled with incentives, consumer education and promotion, market development support, and equipment acquisition assistance. These broader initiatives are justified because of the lost opportunities associated with the installation of inefficient measures. Furthermore, these same activities will

capture energy efficiency resources should they be needed in the near term due to reliability and environmental concerns.

- ***Recommendation: Develop programs that attract the broad masses of contractors, even if these programs do not require these contractors to reach absolute state-of-the-art.***

  There are large segments of the current contractor marketplace that will not be influenced by incentives for state-of-the-art measures and services. In many of these segments, contractor behavior is driven more by consumer demand so these efforts must be coordinated with the building of consumer awareness. Because there are so many sub-markets to consider, it is important for RCP or other initiatives to offer a variety of programs to target specific niches. Designing market stimulation programs for this end of the sector can be done while maintaining other incentives for the state-of-the-art measures if market differentiation can be exploited. Programs for each specific market must be targeted to their respective markets, with respect to the advertising used, the messages conveyed, and the types of incentives offered.

- ***Recommendation: Target programs toward under-served markets where energy efficiency opportunities remain untapped.***

  The RCP and other programs should investigate if program participation is developing in all geographic areas, socio-economic sectors, and housing types where energy savings can be achieved. Programs should ensure that market outreach and incentives are tailored to these segments to attract the interest of contractors and customers. Additional support in developing these markets may be needed to overcome existing barriers.

### Limited Incentive for Some Trades to Participate in RCP

- ***Finding: Some contractor groups, particularly electricians and plumbers, have little incentive to participate in RCP.***

- ***Recommendation: Expand the current eligible list of measures to include several measures attractive to electricians and plumbers***.

  High efficiency hardwired lighting, pool and spa pumps and heater upgrades, high efficiency water heaters are all good candidates for expansion of the RCP program. Attic ventilation, when it is done in concert with sealing of the attic area, may also be included in RCP.

### Coordination with Parallel Initiatives

- ***Finding: In some residential contracting markets, contractors play less of a dominant role in consumer decision-making.***

- ***Recommendation: Ensure that necessary overlaps are in place with retail programs and other initiatives.***

  In products and services where contractors play a relatively minor role, as compared with the role played by do-it-yourself, handyman, or retail markets (e.g., lighting, and water heating), policymakers should ensure that these markets are adequately addressed through complementary program initiatives.

### Promotion of Emerging Products and Services

- ***Finding: The need for, and the benefits of, newer and less familiar products and services such as duct diagnostic service are not well understood by consumers or contractors.***

- ***<u>Recommendation</u>: Conduct an independent assessment of the potential energy savings and related benefits resulting from duct diagnostic services.***

  If diagnostic services and related energy efficiency services are to emerge as a self-sustaining industry, then evidence of their value must be collected and disseminated to consumers and to contractors. One possibility would be to facilitate product and service diffusion through field and laboratory testing, with public reporting of the results. Utilities and national labs have unique specialized skills with regard to performance monitoring that can provide valuable unbiased information to interested consumers, much along the lines of ***Consumer Reports***, but with a focus on efficiency.

# Section 1: Introduction

## *1.1 Background*

This report provides a summary of work that has been undertaken to characterize the residential retrofit contractor market and the role that such contractors play in the selection, installation, and maintenance of energy-related products and services. This report is intended to provide interested parties with a concise, and yet detailed, characterization of the residential retrofit contractor market, including quantitative estimates of how many contractors are involved in each of the relevant markets, and qualitative information on relevant business trends within each contractor segment. Where possible, we highlight areas of future research that will be addressed in follow-up studies.

This project was commissioned by the California Board for Energy Efficiency and managed by Pacific Gas and Electric. The objectives of the overall project were to:

- Investigate contractor certification practices across the nation;
- Develop estimates of the number of contractors offering energy efficiency services to the residential retrofit marketplace in California;
- Characterize the barriers which impede greater use of energy efficient products and practices in the marketplace;
- Provide recommendations for the 1999 Residential Contractor Program (RCP); and
- Develop statewide baseline data on residential retrofit practices and market characteristics.

Concurrent with this research project, members of this project team were also asked to conduct focus group research with both consumers and contractors on issues pertaining to the PY99 Residential Contractor Program that was being planned at the time.[4]

[4] In addition, the work summarized herein was preceded by a process evaluation of the Res-SPC program, reported separately in: "Interim Evaluation: California Board for Energy Efficiency PY98 Residential Standard Performance Contract Program." Wirtshafter Associates, Quakertown, PA 18951, October 4, 1998.

### *1.2 Why Are We Interested in the Residential Retrofit Contracting Market?*

Residential contractors play a significant role in the design and specification of residential retrofit and renovation projects, including a number of types of projects that provide opportunities for capturing increased levels of energy efficiency. Although the do-it-yourself market is large, many households rely on contractors for advice and services related to major energy uses in their homes. This is necessary because, larger energy consuming equipment in the home requires relatively infrequent maintenance and replacement. As a result, few consumers take the time, or see the need, to become technically versed in equipment options and operational details. Recognizing energy efficiency opportunities among the multitude of choices is plainly difficult, even for the experienced technician. Thus it is often left to the contractor to choose or advise the consumer on decisions related to replacing existing equipment.

Given this dependence on contractors for information and services, it is logical for policymakers to direct attention toward contractors as a means of improving energy efficiency in existing homes.

Effecting change within the contracting markets is not a straightforward proposition. The contractor market is a hands-on service industry. Importantly, research completed during this project has highlighted the fact that ***the residential retrofit contractor market is extremely diverse and fragmented***, absent of any major players who might, through visibility or market dominance, influence the overall direction of market transactions. Existing contractors employ a wide range of business models, including those who bid lowest price, those who provide expert advice and quality installations at a premium price, and every permutation in between. Business sizes include many sole proprietors and small shops; as well as large consolidated corporations.

### *1.3 Study Background and Methodology*

Research tasks that provided information contributing to this report are summarized in Table 1.1 below.

**Table 1-1: Summary of Research Tasks**

| Task | Focus | Timeframe |
|---|---|---|
| Review of certification issues | Collect and assess information on various organizations offering certification of contractors | Fourth quarter 1998 |
| Literature review | Synthesize existing information on relevant market barriers and identify areas needing further research | First quarter 1999 |
| Analysis of state licensing records | Develop an improved understanding of the market's structure and estimate the size of the residential retrofit contractor population | Second quarter 1999 |
| Qualitative interviews with 50 contractors | Exploratory research on key topic areas for developing preliminary insights and informing the design of the baseline survey | Third quarter 1998; second quarter 1999 |
| Baseline survey with 444 contractors doing work in the existing residential sector | Characterize market practices in equipment procurement, marketing and specification; profile contractor population; identify perceived barriers to energy efficiency; and track program awareness and participation in Residential contractor Program | Third-fourth quarters 1999 |

***Review of Certification Issues***

The first task undertaken, a review of certification issues, was completed using telephone interviews and reviews of written materials from organizations currently offering contractor certification programs in various industries. This research characterized existing certification activities and examined implications for the Residential Contractor Program (RCP).[5]

***Literature Review***

The second task involved a review of literature on California initiatives, market transformation programs in other states, and selected additional sources, on topics

[5] "Additional Research into Certification and Contractors' Attitudes: California Board for Energy Efficiency PY98 Residential Standard Performance Contract Program Evaluation." Wirtshafter Associates, Quakertown, PA 18951, December 1, 1998.

related to market adoption of energy efficient products and practices and/or market transformation initiatives. The principal focus of this task was to identify and characterize potentially important market barriers to energy efficient retrofit activity, with emphasis given to independently characterizing barriers facing contractors and consumers. This discussion piece was used in formulating a framework for the evaluation of market transformation effects in the residential retrofit market.[6]

### *Estimate Contractor Market Size*

To develop estimates of the size and structure of the contractor population serving California's residential sector, trade websites and the Contractors State Licensing Board (CSLB) records were analyzed. After reviewing the entirety of the licensed contractor population, several specific contracting trades were selected for analysis in this research on the basis of their relevance to the end uses addressed by RCP and similar programs. These included glazing, heating and cooling, insulation, electrical and weatherization as well as general contracting. The gross market size numbers obtained from the CSLB records were used as an initial estimate and adjusted to remove non-residential and non-practicing licensees from market size estimates. Data used in these calculations were obtained through primary data collection efforts described below under the baseline survey.

In addition to estimating overall market size, this task included an analysis of the degree to which contracting businesses obtained and used multiple contracting licenses. The degree of dual licensing (or lack thereof) was used as an indicator of the degree of baseline market specialization among those trades most involved with energy efficiency retrofits.

### *Qualitative Research*

In late 1998, and again in mid-1999, qualitative interviews were conducted by telephone with 50 licensed California contractors, including heating/ventilation/air conditioning (HVAC) contractors, insulation contractors, glazing contractors, and general contractors. This exploratory research was used to investigate current procurement and installation

[6] Wirtshafter Associates, "Discussion Paper: Measuring Market Effects from CBEE Initiatives to Influence the Residential Contracting Market," Draft working paper, July 1999.

practices, opinions towards energy efficient products, perceptions of consumer demand and preferences, competitive factors influencing strategic decisions, and business characteristics.

### *Baseline Survey*

The final task was a baseline survey of contractors performing work on existing homes in the state of California. This research was undertaken to benchmark current practices in the retrofit market, to identify barriers to energy efficient products and services, and to quantify awareness levels regarding RCP. This data will provide the foundation for future time-series analyses of trends in market adoption of key energy efficient practices addressed by RCP. In total, 444 contractors were surveyed in this task. The survey instrument included a number of sections with trade-specific questions; respondents were requested to complete those sections of the survey that corresponded to their principal areas of market activity. Table 1-2 summarizes the representation of the different contractor trades in this research. [7]

[7] Wirtshafter Associates, "California Residential Retrofit and Repair Contractor Baseline Survey: Supplemental Report," prepared for CBEE, January 2000.

**Table 1-2: Baseline Survey Response Counts**

| Number of completes by Licensed specialty of respondent | | Number of completes by survey subject area | |
|---|---|---|---|
| Glazing | (102) | Windows | (120) |
| Insulation | (23) | Insulation | (22) |
| Electrical | (99) | Lighting | (122) |
| General | (81) | Weatherization, house doctoring, etc. | (17) |
| HVAC | (139) | Heating/cooling systems | (143) |
| | | Ducts | (81) |
| Total respondents | (444) | | |

The earlier elements of this market research project were used to inform the development of the statewide Residential Contractor Program that replaced the Res-SPC program for PY99. Later elements were used to establish market baseline data and to provide insights for shaping future evaluation efforts.

This report provides a synopsis of the findings developed over the course of this evaluation. In places, this report also reflects information developed through concurrent research conducted by the project team outside the scope of this contract for the administrators of RCP and its predecessor program, the Residential Standard Performance Contract Program (Res-SPC). This research consisted of focus groups with residential contractors and consumers addressing critical issues pertaining to the Res-SPC and RCP programs.

### *1.4 Report Organization*

The major objectives of this report are to (1) characterize the contractor market in all of its complexity and highlight business trends in the contracting industry that affect energy efficiency, (2) describe important barriers to greater contractor promotion of and installation of high efficiency options, (3) assess program and policy options for intervening in these markets, and (4) describe the PY99 RCP program, and (5) review implications for the newly implemented Residential Contractor Program and for other

initiatives that could be developed to address the existing residential sector. These topics are discussed in Sections 2 through 5, respectively of this report.

# Section 2: The Market for Residential Retrofit Contracting and Energy Efficiency

## *2.1 Overview*

There are truly many markets to transform within the residential contracting arena -- both on the consumer demand-side of the equation, and on the contractor supply-side of the equation. Most importantly, while it is convenient to offer one program to address all residential retrofit contractors in California, no single market intervention can hope to transform the entire marketplace. No one would expect that the same exact intervention formula could address both the business development needs of exclusive four-star restaurants, and the business development needs of the fast food industry. Similarly it is unlikely that interventions suited to premium service providers in the contracting industry would be equally effective with those focused on providing low cost services. Rather, the challenge is to develop a flexible portfolio of tools that can be used to address opportunities within the various contractor sub-markets.

Before potential intervention strategies can be discussed, it is important to understand the structure and dynamics of the target marketplace. In this chapter we detail the different types of markets that exist for residential contracting, how these various markets currently use energy efficiency, and the barriers to greater use of energy efficiency within those markets. We begin with a discussion of the major categories of efficiency measures applicable to a retrofit market.

## *2.2 Energy Efficiency Measures Relevant to the Residential Retrofit Contracting Market*

The following list provides a brief overview of several key areas of opportunity for retrofits improving the energy efficiency of existing homes in California through RCP or similar programs.

- ***HVAC equipment installation and maintenance***—Opportunities exist to replace old or broken equipment with more efficient and properly sized models. Maintenance that provides correct pressure and airflow can also

produce significant savings. Systems in MF buildings run the gamut from large central units to individual window units.

- ***Sealing and weatherizing homes to reduce outside air infiltration***—The use of blower door diagnostics, along with remedial weatherstripping and caulking, has the potential for savings and comfort gains in the less mild climatic regions. Air quality and combustion safety are potentially important issues that need to be addressed at each home as these services are delivered to consumers.

- ***Duct redesign, repair, balancing, and leakage reduction***—Poorly sealed or designed ductwork may be a problem in almost any home, including newly built homes. Opportunities exist to repair these leaks and improve the balance of air flowing to various parts of the home.

- ***Ceiling and wall insulation***—Insulation can be added to ceilings, walls, and floors to levels that are at or above Title 24 standards although opportunities may be limited by prior adoption activities or by physical features of the site. Newer homes, and many retrofitted older homes, are already insulated to levels near Title 24 or to the physical limits of the existing wall cavities. Applying insulation to mobile units is physically possible, though not to Title 24 levels. Any improvements to the shell of existing mobile homes may be hard to justify on an economic basis.

- ***Energy efficient windows***—Replacement of existing windows with higher efficiency models produces some energy savings, although justification for replacement is usually related to issues of comfort, aesthetics, and re-sale value rather than energy savings. Window replacement in mobile homes is often more expensive as these windows are not standard in size.

- ***Energy efficient lighting***—Opportunities exist for upgrading both indoor and outdoor lighting. The common areas of multifamily buildings provide a big

opportunity for increased efficiency, and importantly, the problem of split incentives among the property owner and tenant is not an issue.

- ***Pipe insulation and showerheads*** — These measures are widely applicable in the retrofit market, providing easily installed and low cost opportunities for energy efficiency retrofits.

### *2.3 Diversity in Consumer Markets for Residential Retrofit Contractor Services*

It is important for policy makers to understand that there is not a single residential contracting market, but in fact, many different markets for contractor services. On the consumer demand side of the equation, these markets differ by:

- The type of housing served: single family, multifamily, or mobile home;
- The type of product or service required: HVAC, insulation, windows, etc.;
- Climatic regions in the state; and
- Receptivity of owner to energy efficiency: This includes a broad set of conditions including economic status, age and condition of home, expected occupancy length, concerns regarding environment, and awareness of energy efficiency opportunities, all of which affect the type of service offered by contractors.

With more than 11,827,000 housing units in California in 1996[8], the potential market for energy efficiency appears to be inexhaustible. In actuality, the potential may vary significantly from one segment to another. In 1990, there were 550,000 mobile homes, 6,100,000 single-detached homes, 1,800,000 duplex, triplex, and quads, and 2,600,000 multifamily units. These numbers alone indicate significant differences in market potential from one housing type segment to another.

Many factors, particularly the local climate, the existing level of energy efficiency, the valuation of energy efficiency by the owner, the condition of the home and its

[8] 1996 estimate, Population Estimates Program, Population Division, U.S. Bureau of the Census. US. Census Bureau; ***Historical Census of Housing Tables: Units in Structure***, 1990 Decennial Census, Downloaded from Website 9/17/99.

neighborhood -- all work together to determine the real market potential for energy efficiency of a housing unit. There does not exist, at this point, a reliable assessment of the full energy efficiency potential within the existing California housing market as it relates to residential contracting. The willingness of owners to invest in energy efficiency is also affected by whether they occupy the home or rent it out, their financial situation, the length of time they expect to stay in the home, their expectations as to the dollar value of the savings that they will receive, and their trust of the contractor providing services.

A diverse set of factors influence whether or not a home is good candidate for energy efficiency upgrades. Specifically:

- For some homes, the energy efficiency opportunities have already been addressed while, for others, there remain physical constraints that prevent homeowners from addressing these opportunities.
- Climate plays a particularly important role, as homes in some parts of California are likely to have little or no heating and/or cooling loads.
- Low income households are unlikely to have funds available for required co-payments and programs funded through the Low Income Governing Board (LIGB) are likely to provide larger benefits to owners and tenants of lower income housing.

Yet, even discounting new housing (about 800,000 units between 1990 and 1996 that are likely to be well insulated) and the many homes weatherized over the last twenty years of utility programs, the number of untreated homes remains quite large. While insulation opportunities as reported by some contractors are becoming harder to find,[9] other new energy efficiency opportunities in HVAC and ductwork may be quite large even in newer structures.

[9] The baseline survey had difficulty finding insulation contractors who still provide services to the residential retrofit market. Only about 15 % of the insulation contractors contacted provide services to existing residential homes. However, those contractors in the insulation business still believe that approximately half of the homes in California still need attic insulation.

### *2.4 Diversity in Providers of Residential Retrofit Contracting Services*

Another useful way to understand the complexity and size of the residential contracting market is in terms of the types and numbers of active contractors in the market. This may be accomplished relatively systematically through an analysis of licensing records and, for the purposes of characterizing and quantifying the gross size of the contractor market, we have chosen to rely upon these state license data. This is perhaps the most workable approach to tracking the firms in the market and quantifying the size of the market that the policy efforts and programs seek to influence.

The Contractors State Licensing Board (CSLB) has primary responsibility for contractor licensing and maintaining a database of licensed and active contractors. With approximately 280,000 active contractor licenses currently issued, the CSLB receives more than 20,000 applications for new licenses each year.

In the following section we provide some background on the contractor licensing categories in California, followed by a descriptive analysis of the contracting market obtained from an analysis of a database of licensees.

#### *2.4.1 Overview of Contractor Licensing Categories*

The CSLB has established a total of 104 general and specialty license categories. Broadly speaking, the CSLB Classification fall into the following categories:

- **A-General Engineering** -- involved with the construction of stationary capital works projects e.g., bridges, highways)
- **B-General Building** -- involved with the construction of inhabited structures
- **C-Class Specialty Contractor** -- specialties generally related to the construction of inhabited structures
- **D-Class Specialty Contractor** -- very focused specialties (ranging from awnings to blasting to hydro-seed spraying)

There are approximately 65 D classifications, only one of which (D-65: Weatherization and Energy Conservation) is specifically related to energy efficiency. A new category, the Home Improvement Certification (HIC) is also being established but has not yet been assigned a specialty code. Starting in the spring of 2000, contractors providing home

improvement services will be required to hold a Home Improvement Contractor (HIC) license. This license is designed to control the quality of the contractors providing broad-based home improvement services.

### *2.4.2 Estimated Size of the Relevant Contractor Market*

Table 2-1 shows our estimate of the actual number of contractors working in the residential market in California for five key contracting specialties.

**Table 2-1: Estimated Residential Contractor Population in California in 1998 for Key Trades Related to Energy Efficiency**

| CSLB License Class | Number of Firms Listed in CSLB as "Active Licenses" | Proportion Confirmed as Still in Business[10] | % Providing Residential Retrofit Services [11] | Total # Active Contractors in Residential Retrofit Market |
|---|---|---|---|---|
| C-2 Insulation | 1,180 | 80 % | 15 % | 142 |
| C-20 HVAC | 7,206 | 65 % | 37 % | 1,733 |
| C-17 Glazing / Windows | 2,493 | 90 % | 48 % | 1,077 |
| C-10 Electrical | 17,426 | 80 % | 18 % | 2,509 |
| B General Contracting | 90,889 | 45 % | 17 % | 6,953 |
| Total contractors: | 119,194 | | | 12,414 |

The information in the CSLB database overstates the number of contractors likely to be providing services to the residential sector. When using the CSLB data, there are two key determinants that must be taken into account: (1) business turnover, and (2) the percent of contractors that actually work in the existing residential sector. Our research suggests that there is a relatively high rate of turnover in this sector, as reflected by the percent of telephone numbers that were not available through public directories. Our research suggests that contractors tend to focus on either residential work or commercial work, with relatively few targeting both markets. Both of these findings are also confirmed by recent survey research conducted by Opinion Dynamics Corporation for CBEE[12] and for the Contractor Baseline Study.

[10] As a result of business turnover and the practice of renewing licenses even when a contractor has little or no current business, the CSLB data overstates the number of active businesses. The existence of a working phone number was used as an indicator of real presence in the marketplace.

[11] Percentages based upon data collected through telephone surveys conducted in 1999. Excludes contractors reporting that they work exclusively in the commercial or industrial sector in residential new construction only.

[12] Wirtshafter Associates and Opinion Dynamics Corporation, "Residential Contractor Program Market Assessment and Evaluation Study; Single Family Customer Baseline Survey," prepared for CBEE and SCE, December, 1999.

### *2.4.3 Overlap in Key Licensing Classifications*

Many contractors hold multiple licenses, reflecting their particular specialty areas and depth of capabilities. To assess the prevalence of multiple licensing, we reviewed the CSLB data in detail for three key contractor groups related to home efficiency: HVAC, glazing, and insulation. For each specialty, we have listed the five contractor classifications with the greatest degree of overlap, and identified the proportion of contractors holding this dual licensing.

The most common pattern of dual licensing, as illustrated in Table 2-2, is the practice of holding a general contracting license in addition to one or more specialty licenses.

**Table 2-2: Overlap of Specialty Trades with General Contracting Licenses**

| Primary License Category | Proportion with General Contracting License | Next most common licenses (percentage of primary licensee also hold this license) |
|---|---|---|
| Insulation | 47.8% | Drywall (20%), asbestos (10%), paint and decorating (10%), electrical (9%) |
| HVAC | 19.2% | Refrigeration (14%), electrical (12%), sheet metal (12%). |
| Glazing | 16.7% | Insulation (2%), paint and decorating (2%), ornamental metals (2%) |

This analysis of the CSLB records indicated that there is otherwise a substantial degree of fragmentation among those trades relevant to energy efficiency. For example, we find virtually no overlap between glazing and HVAC contractors. In fact, the glazing industry appears to be virtually divorced from all of the other specialties likely to influence energy efficiency, with the exception of the general contractors. (Even the overlap with general contractors is less than what is found for other specialties.) To a lesser degree though, this relative independence from other trades affecting household efficiency is widespread.

These data reinforce other information suggesting that, when it comes to efficiency-related services, existing contractor businesses tend to operate within a narrow focus and seldom have the staff or capabilities to provide a comprehensive set of efficiency-

improving upgrades as part of a bundled service offering. It becomes apparent then that the contractor market segments itself along well-defined trade specialties, each addressing its own distinct niche in the residential contracting market. Confirming this, the Contractor Baseline Study found that fewer than two percent of contractors in these trades provide whole-house or house doctoring inspections.

Additional findings on baseline contractor market practices and trends were developed throughout the course of this evaluation contract. A synthesis of key findings is summarized on the following pages.

## *2.5 Business Trends Related to Residential Retrofit Contracting and Energy Efficiency in California*

This section provides a summary of salient business trends among residential retrofit contracting segments that are related to energy efficiency. Where relevant, factors and trends related to housing type, business model, and/or climate are also provided. This market assessment information was derived from a series of qualitative interviews and focus groups with contractors, a detailed literature review of recent studies containing information on these contracting markets, as well as data from the baseline survey.

### *2.5.1 Insulation Contractors*

Feedback obtained through qualitative interviews indicates that there is a prevalent view among insulation contractors that the market for attic retrofits is reaching saturation in some areas (the Bay Area being one example). This declining market size situation is reported by contractors to be compounded by the withdrawal of a number of utility-sponsored programs, thereby leading to decreased consumer demand for insulation services. The number of service providers has reportedly declined, and a number of insulation firms appear to be struggling to stay profitable and viable. It is not clear whether this trend has bottomed out or is likely to continue, but our analysis of the data from the CSLB records showed that the California state market has few contractors providing insulation retrofits and that this specialty is more likely than others to have dual licensing as general contractors. Each of these facts indicates that there may be a weaker business base for specializing in insulation retrofits than in specializing in some other retrofits trades affecting home energy efficiency. The Contractor Baseline Survey

estimates that only 15% (142) of the CSLB licensed insulation contractors provide services to existing homes

Baseline practices in the retrofit market have been influenced by state requirements enacted through Title 24. A majority of the contractors interviewed in our qualitative research describe Title 24 requirements as providing a reference point for determining the level of insulation to recommend for retrofit jobs. However, there is variability in this regard since there is no legal requirement that retrofits will conform with these requirements. In contrast, remodeling work is required to meet Title 24 standards. The Baseline Survey indicates that as much as 95% of insulation work in existing homes is bid at or above Title 24 standards; unfortunately, the data do not permit disaggregation of retrofit vs. remodeling jobs.

The firms interviewed in our qualitative research all offer a standard package of insulation services. Though some may claim they use higher R-value products, the real differences are in the quality of the installation, (a value unobtainable via survey). While some firms are willing to consider offering blower door sealing, and using more expensive insulation, others resist such changes. A key concern for all respondents who had considered, or were still considering, diversifying into more sophisticated energy efficiency services was the risk that the venture might prove unprofitable. Some, who had ventured into this field in order to participate in prior utility programs, immediately terminated this activity at the close of the program due to the inability to recoup their on-site costs from the pricing they could charge in the market.

Other findings include:

- Remodeling projects are better candidates for wall insulation business than are retrofits to existing homes that are just looking to increase home comfort.
- Marketing among insulation contractors is, for the most part, reactive rather than proactive. Little advertising or consumer education is undertaken. This is a result of low profit margins and resource limitations and not a reflection of contractors undervaluing this activity. Interestingly, many contractors perceive that

advertising and public information campaigns increase consumer demand and are very valuable to their business development.

- Intermittent supply problems have arisen during periods of strong construction activity. A bigger issue, however, is the inability to retain staff, as there is a great deal of turnover in this labor-intensive business.

### *2.5.2 Heating/Cooling Contractors*

In the qualitative interviews, contractors reported that the California market tends toward the lowest allowable efficiency levels for HVAC systems. This was subsequently corroborated in the data collected in the Contractor Baseline Survey. According to the baseline data, 82% of the furnaces and 79% of the air conditioners installed in 1998 were standard efficiencies. Building codes were credited as having a large influence on efficiency levels.

Consumer demand for higher efficiency systems in retrofit applications is weak. More than 70% of the HVAC contractor respondents in the Baseline Survey indicated that fewer than one-tenth of their customers request units with SEER ratings of 12 or better.

In mild areas the incremental cost of higher efficiency systems may not be justifiable. If seasonal heating/cooling bills are less than $100/month, for example, the payback period may exceed the expected lifetime of the equipment. In cooler climates, economic factors constrain demand for higher efficiency equipment.

Our research indicates that most HVAC contractors rely on the standard practices for sizing systems and repairing units and ductwork. Duct tape predominates among duct sealing methods. Most of the contractors interviewed allow that there are potential savings from duct improvements, although they typically undertake little diagnostic analysis activity. Baseline survey data indicate that visual inspection is the most prevalent means of identifying duct-servicing needs. Among contractors who provide duct services, only 7% report that they use any kind of diagnostic equipment on all their duct jobs. Of the 85 respondents who offered duct services, only four own a duct blaster, four own a blower door, five own a micromanometer, and nine own a flow hood. Baseline survey data suggest that for the majority of contractors, there is virtually no evident consumer demand for duct diagnostics and servicing.

Another important dynamic in the marketplace is the fact that contractors make greater profits for changing out a system than they do for maintenance or duct repair. While maintenance services are provided by most firms, and provide "bread-and-butter" revenue for their business, the main focus of this activity is to maintain a contractor/customer linkage for future higher profit purchases of new units.

### *2.5.3 Windows Contractors*

Double-paned windows are the norm in most of California, representing 77% of the windows installed in 1998. Triple-paned windows are virtually non-existent in the retrofit market. The Contractor Baseline survey also found that only 33% of the windows installed in 1998 had a low-e coating, and only 5% were double low-e.

Code requirements have pushed the higher efficiency windows in the new construction market, as builders must opt for increased efficiency or limit window surface area in order to meet building performance modeling requirements. In the retrofit and remodeling markets, some of the advances in higher efficiency windows seem to be the result of a dedicated market push by a select group of contractors. There is a minority group of glazing contractors who only market what they consider to be higher efficiency products. However, support for higher efficiency windows is by no means universal. In the Baseline Survey, contractors reported that 23% of the windows installed in 1998 were only single-paned. It is in the replacement market, and in localities with weak code enforcement, where low efficiency windows are still used.

The contractor market is split in its opinions of the value of higher efficiency windows as compared to other window options. Some contractors are strongly convinced of the superiority of high efficiency windows, viewing these products as also offering superior performance in terms of noise reduction, fabric protection, longevity as well as comfort and utility bill savings. Other contractors feel that customer needs vary from job to job and that standard windows offer different options for meeting consumer needs. In particular, price was felt to be a strong factor in window selection and the lower cost standard windows were of value to budget constrained consumers. Sixty percent of the window contractors interviewed in the Baseline Survey cited cost as a key barrier preventing greater consumer adoption of more energy efficient windows.

Contractors report that there is little awareness of and demand for Energy Star windows among consumers, retailers, and builders. Only 32 % of the 73 window contractors in the Baseline Survey were aware of the Energy Star rating. Only three of these contractors used Energy Star windows in all of their installations.

Installation practices for standard vs. high efficiency equipment windows do not differ, but there are clear ways to distinguish high efficiency products and practices from standard products. Not surprisingly, we found a range of business development models existing in the contractor market. Most of the contractors install low-e, efficient windows in replacement and new home situations, because the energy code severely limits the amount of window area allowed if lower efficiencies are used. Still, as mentioned above, there are pockets of the market where low efficiency windows are still used. Handyperson type contractors may lag other contractor groups in awareness of, and use of, more efficient windows. The extra cost and the lack of understanding by contractors and customers slow movement to what is commonly called double low-e windows (ones with a spectral coating applied to the glass surface). U-values for typical / “standard” windows vary by geographic/climate region.

Manufacturers were characterized as having a vested interest in promoting higher efficiency (higher profit) windows and were reported as providing useful support to sales of these windows. Examples of such support included labeling on the windows, additional information pieces such as brochures and point of purchase displays, and price discounts.

### *2.5.4 General Contractors*

General contractors cover the gamut, from handypersons to homebuilders. As such, there is great diversity in their experience, business methods, and energy efficiency practices. At one extreme are the large multi-task projects, which tend to be larger (more expensive) and more complex than the types of projects awarded to specialty contractors. At the other extreme are found licensed general contractors who replace a single window or fix a doorjamb. Most general contractors do not supply services that are relevant to this study or the RCP. Only about 17% of the general contractors contacted provide services such as HVAC, duct repair, windows, lighting, or

weatherization to existing residences. However, because there is such a large pool of general contractors statewide, this minority group still represents a significant number of general contractors involved in efficiency-related retrofits.

On larger jobs, general contractors tend to have a closer relationship with their customers than do specialty contractors due to the greater complexity of the jobs they are awarded. General contractors could thus be very influential in increasing consumer awareness of energy efficient options and/or specifying higher efficiency measures directly.

Based on information collected from telephone interviews with general contractors, price appears to be a major barrier to efficiency inclusions in remodeling projects. Customers are characterized as often being budget driven, struggling to put together the cash for the project at hand. Incremental pricing for higher efficiency options has to appear to be a good fit for the individual consumer's preferences; otherwise contractors report that the contractor will not push the measure and customer will not accept it.

### *2.6 Synopsis of Contractor Market Characterization*

This chapter presented information characterizing four important contracting trades and trends in their fields, which affect business operations and marketing choices:

***Insulation contractors*** --- This industry apparently is suffering from weak market conditions, with demand having declined in recent years to a point where business owners appear to be questioning the viability of working the retrofit market in the residential sector. Price competition is reported to be very strong, limiting the ability to take on any additional costs such as consumer marketing or equipment purchases. Title 24 does influence the R-values installed despite the fact that contractors are not required to achieve this standard in retrofit work. Little work is reported to exceed this level however as it is difficult to demonstrate a good return on investment to the consumer.

***HVAC contractors*** -- This is an industry that exhibits a number of tendencies toward less efficient options when allowable under state regulations. State standards clearly influence the SEER of retrofits as installations otherwise trend toward the lowest cost

and least efficient equipment allowable. Furthermore, equipment replacements are more profitable than equipment servicing, a factor influencing contractor marketing strategies, and most likely dampening the development of a larger HVAC servicing industry. Little use of advanced diagnostic techniques is reported although there are a minority of firms that are exceptions to this pattern.

***Windows contractors*** -- Retrofits as a whole probably lag behind new construction in the efficiency of the windows used. This is one industry, however, where there appears to be a group of contractors who are enthusiastic supporters of, and promoters of, the higher efficiency products available in the marketplace. Despite this, it appears that there are still areas of the state where substantial use of single paned windows persists.

***General contractors*** -- This is a very diverse group of contractors who complete or manage a wide range of residential projects, making it more difficult to summarize the status of this trade with respect to energy efficiency practices. General contractors frequently subcontract work to one or more specialty contractors. It is unclear how this arrangement alters the decision process with respect to efficiency options, but it would appear that the general contractor is in a more influential position with the consumer than are the subcontractors. Price reportedly is a dominant criterion for equipment selection and specification decisions in a majority of remodeling jobs managed by general contractors.

It is apparent from this information that existing trends in each contracting industry are likely to exert different influences on receptivity to RCP, or to energy efficient technologies generally, from one contracting specialty to another. The next section discusses our findings on barriers specific to energy efficient products and services in the residential retrofit contracting market in California.

# Section 3: Important Market Barriers

In this Section, we define market barriers, provide a summary of crosscutting market barriers within the residential contracting market, followed by a discussion of trade-specific barriers that impede the widespread use of energy efficient products and services.

## *3.1 A Definition of Market Barriers*

In developing policy initiatives aimed at transforming the market for energy efficiency in the residential sector, it is valuable for policymakers to understand and identify the market barriers that inhibit the attainment of a greater level of energy efficiency within the existing residential contracting marketplace.

It is important to note that the assumption that there exist barriers in the marketplace presumes that there are otherwise lost opportunities or a sub-optimal allocation of resources devoted toward investments in energy efficiency. Importantly, it is outside the scope of this study to assess where such allocations are in fact sub-optimal and therefore true "market barriers." However, to the extent that there are challenges in the marketplace, and to the extent that these challenges inhibit efficiency levels in areas that CBEE policies are directed, these are assumed to constitute "market barriers" within the current policy environment.

For the purposes of our discussion, market barriers related to the residential contracting market fall into one of two categories: (1) barriers that are common across all contracting trades, generally, and (2) barriers that are specific to the services and products provided by the individual contracting trades. Both of these categories are discussed in more detail, below.

## *3.2 Market Barriers Common across Residential Retrofit Contracting Trades*

Barriers, or challenges, that are common across all residential retrofit contracting trades in the California market include (1) lack of consumer interest, (2) a low level of consumer awareness, (3) a tight housing market, (4) a tight job market, and (5) a relatively mild climate. Table 3-1 summarizes the results from the Contractor Baseline Survey

documenting barriers perceived by contractors. Interestingly, cost factors are the largest perceived barrier for HVAC and windows, while lack of consumer demand is the primary barrier for all other areas.

**Table 3-1: Factors Preventing Contractors from Installing More Energy Efficient Equipment and Services**
**(Percentage of Contractors Mentioning Factor)**

| Barriers | HVAC | Ducts | Windows | Insulation | Weatherization | Lighting |
|---|---|---|---|---|---|---|
| Lack of consumer demand | 14% | 42% | 12% | 35% | 35% | 47% |
| Cost of the system or unfavorable economics | 45% | 14% | 32% | 26% | 13% | 21% |
| Equipment availability | 5% | 1% | 4% | 0% | 13% | 7% |
| Equipment reliability and performance problems | 3% | 1% | 1% | 0% | 6% | 4% |
| My firm is not in a position to provide these services | 3% | 19% | 5% | 26% | 30% | 1% |
| Something else | 1% | 3% | 1% | 4% | 0% | 2% |
| There are no factors | 0% | 0% | 45% | 8% | 6% | 20% |

### *3.2.1 Lack of Consumer Interest and Demand.*

Focus groups conducted with consumers and contractors, as well as quantifiable results from the Contractor Baseline Survey, have reiterated over and over that consumer interest in energy efficiency ***relative to other product and service attributes*** is perhaps the most significant barrier to contractors installing a higher percentage of energy efficient equipment. This lack of consumer interest represents the manifestation of several interwoven factors, including (1) low energy bills, (2) a strong economy, (3) past gains in energy efficiency, (4) mild climate, and (5) perceptions that most modern equipment is energy efficient. In many respects, this lack of consumer interest may not be wholly irrational. Where the climate is mild, for example, the economic benefits may simply be too small to warrant a significant amount of consumer interest. Comfort

benefits appear to rank much more highly and are a better selling point than energy efficiency. Moreover, to the extent that the California economy is strong and opportunity costs are significant, this results in a greater gap between the consumers' discount rates and the societal discount rate. In any event, the Contractor Baseline Survey data demonstrated plainly that for most relevant product and service categories there are negligible levels of consumer demand for high efficiency options.

### *3.2.2 Low Level of Consumer Education and Awareness of Energy Efficiency Options*

Importantly, research has indicated that consumer awareness and education related to energy efficiency options is at the lowest levels recorded in years. A recent study conducted for CBEE[13], for example, notes a gap in consumers' perceived knowledge of energy efficiency options relative to their actual knowledge when probed for specific information. Thus, although consumers are of the opinion that they are well informed and familiar with state-of-the-art energy efficiency measures and practices, they are not. Since all products have multiple attributes, contractors must first educate consumers in a gentle fashion to pique their interest in energy efficiency options. This is a time-consuming and often unsuccessful effort, thereby leading many contractors to forego such a sales approach. This barrier is related to the former in that, although it appears that consumers are not very well informed in many areas of energy efficiency, there is not a perceived pressing need for them to become better educated and the costs of doing so are significant.

### *3.2.3 Tight Housing Market*

With the upturn in the California economy, and the concurrent upturn in housing demand, homeowner mobility increases. As a result, homeowners scrutinize potential improvements within the context of re-sale value. Conversely, homebuyers are focused on "location, location, location" as their primary decision-making factor. The tight housing market makes it harder for buyers and tenants to insist on energy efficiency when finding a home. Existing properties are quickly sold even if energy efficiency is deficient. For

[13] Hagler Bailly Consulting, "CBEE Baseline Study on Public Awareness and Attitudes Toward Energy Efficiency - Final Report," prepared for CBEE, June 1999.

building owners, spending extra money on an energy efficient heating system that may not be highly valued in the marketplace is simply not a priority.

### *3.2.4 Tight Job Market*

The tight housing market has created a good business environment for contractors, but also has created a shortage of skilled contractors. This shortage means that existing contractors have more work than they can handle. Under these conditions, there is little incentive or time for contractors to develop new business or spend extra time with customers selling the idea of energy efficiency. Contractors have noted in focus groups and telephone interviews that one of the primary limitations on growing their businesses and branching out into new areas is that of hiring and retaining qualified staff. In the insulation trade, high staff turnover was noted. It has also been noted, however, that technical schools are graduating far fewer trained HVAC technicians in recent years than they did in the past. From the consumers' perspective, this barrier may be reflected in difficulties that homeowners reportedly have in locating contractors who are able to respond to their needs in a timely fashion.

### *3.2.5 Mild Climate*

Although the climate within California varies tremendously, many of the more populated parts of the state are located in relatively mild climate zones. This climate limits the cost effectiveness of upgrading to more energy efficient equipment. Where the economics are less favorable, it is more salable to focus on issues relating to consumer health and comfort. Conversely, those areas with the most severe climate conditions also are among the poorest areas in the state.

## *3.3 Trade-specific Market Barriers*

There are also several market barriers that are unique to the products and/or services provided by various contractors and warrant further discussion. These are highlighted, below, for each of the following contractor groups:

- Insulation Contractors
- Heating and Cooling Contractors
- Window Contractors

- Lighting Contractors
- General Contractors

### *3.3.1 Insulation Contractors.*

Barriers identified as being specific to the insulation contracting industry in California include:

- It is reported that a significant percentage of homes are already well insulated, and that the cost-effectiveness of increased levels of insulation is declining. Many of the remaining homes without high levels of insulation have significant constraints such as limited access to walls and ceilings, inadequate cavities in which to place insulation, and/or poor housing conditions with other pressing repair issues taking priority.
- With manageable energy bills and fewer utility-sponsored programs, there is a diminished level of consumer demand for insulation.
- Wall insulation is costly to install. Older homes with lathe and plaster require new sheet rocking if insulation is installed from the inside. Blown in insulation from the outside requires restoring the stucco exterior to its original look.
- Consumers are viewed as desiring either improved comfort of the home or lower utility bills - or both. Consumers are also viewed as shopping for low prices; price competition is reported to be very strong. Product differentiation is not, in general, perceived to be important in the insulation market.
- As the Contractor Baseline Survey confirms, among homes where insulation has been recommended but not installed, cost is the principal barrier to the installation.

### *3.3.2 Heating and Cooling Contractors.*

Barriers identified as being specific to the HVAC contracting industry include:

- The greatest barrier to high efficiency HVAC systems is the incremental costs of these systems. Replacing an existing air conditioning unit with a high efficiency unit of SEER 13 or higher usually requires that contractor also change out piping and the evaporator coil. This extra expense limits both the practicality and economic feasibility of upgrading above SEER 12 in existing homes.

- With codes in place, many consumers and installers strive to meet (but not exceed) code in the most cost-effective way possible.
- Qualitative interviews suggested that some contractors perceive that there are equipment reliability issues related to higher SEER equipment. However, the Contractor Baseline Survey found that this was not a widespread barrier: only 3% of the HVAC contractors thought that the reliability of the higher efficiency units was a factor in preventing them from installing the higher efficiency units.
- Ducting systems are usually not readily visible and are therefore typically not a high priority to most homeowners. Further, homeowners are generally unable to determine if existing ducts are properly installed.
- Contractors perceive that it is more costly to use advanced duct sealing techniques and that they will not be competitive if they specify such approaches.
- Informal diagnostic techniques that may not be consistently reliable are still considered by contractors to be sufficient in the majority of cases and according to the baseline data are the predominant practice in the market today.

### *3.3.3 Window Contractors*

Barriers identified as being specific to the window contracting industry include:

- Consumer awareness of, and demand for, energy efficient windows is low in some areas of California, but overall there is greater demand for efficient products in the windows area than in other retrofit areas. This demand does not carry over to the highest efficiency windows, however, which remains a very small minority of installations.
- There is limited awareness among contractors regarding the nuances of high efficiency window options as well as the benefits of high efficiency windows.
- Qualitative research indicates that aesthetics often drive window purchase decisions, with customers desiring to match existing windows and therefore diminishing the importance of energy efficiency.
- For the most part though, there is no conflict between selecting a window which is both efficient and which has other desirable features (such as reliability). Baseline survey data and qualitative interviews indicated that the more efficient windows are widely regarded by contractors as the superior products in the market.

### *3.3.4 Lighting Contractors*

Barriers identified for the lighting contracting industry include:

- Low consumer demand appears to be a major barrier to greater contractor sales of higher efficiency lighting options. Two thirds of lighting contractors interviewed in the Contractor Baseline Survey reported very low consumer demand among their customers; this included 40% who have never had customers request energy efficient lighting.
- As was typical for other end uses, cost was perceived as a primary factor contributing to the lack of demand. Aesthetics of the lighting is also an important factor governing product choices.
- Information barriers seem to be significant for lighting technologies. Not only do contractors see this as a key barrier to consumer demand (second only to price), but the contractors themselves are also relatively uninformed as a whole with respect to the benefits of higher efficiency products. In all, 42% of lighting contractors reported that they did not know what the likely payback of energy efficient lighting would be. This low level of knowledge among potential product specifiers must certainly reduce baseline levels of marketing and promotion of energy efficient options.

### *3.3.5 General Contractors*

Barriers identified as being specific to the general contracting industry include:

- Price is a major concern with customers and energy efficient equipment typically costs more than standard efficiency equipment.
- General contractors with limited expertise in certain areas will often defer to their subcontractors. For example, a general contractor without expertise in HVAC may defer to the HVAC subcontractor for equipment recommendations.

## *3.4 Synopsis of Market Barriers*

This chapter reports on a number of market characteristics which are influential in shaping how both consumers and suppliers operate in the residential contracting marketplace.

***Consumer markets*** -- A number of distinct market segments exist within the existing housing market overall. These can be defined in terms of housing stock and end uses, income levels, climatic zones, and other factors. Efficiency opportunities within each sub-market will be influenced by each of these attributes as well as the awareness and preferences of the individual homeowner.

***Contractors*** -- Many contractors tend to be somewhat specialized in focus, holding licenses in only one or a few closely related fields, rather than a comprehensive set of retrofit specialties. Where jobs require a broad array of contracting skills, it is more common for firms to team with others having the needed expertise rather than developing very broad skills internally. Thus, there are few firms offering whole-house services in the current market.

***Barriers to greater promotion of efficiency by contractors*** -- Common barriers to greater promotion of efficiency by the contractors include: the temperate climate and its limiting effect on achievable savings, lack of consumer demand for efficiency options, price competition, and tight housing and job markets. Within the specialties other barriers may also play key roles. For example, in the windows markets aesthetic factors are very important to consumer decisions whereas in wall insulation markets cost and site constraints are major impediments. Newer techniques such as duct testing may not be well understood by contractors and may thus be adopted fairly slowly without program interventions.

***Unique barriers of market segments*** -- Market transformation may proceed at different rates in the multifamily and mobile homes markets as compared to the single-family markets as a result of additional barriers in these market segments. Diffusion rates are also likely to vary across contractor segments, being especially influenced by the firms' business model and willingness to incorporate market innovations.

These findings provide some indications of the vast heterogeneity that exists in the residential retrofit market and suggest that the diffusion of efficiency innovations will surely vary throughout the different sub-markets. It follows that the importance of specific program elements will vary accordingly, with each trade responding somewhat

differently from the others. The next section discusses some of the intervention strategy options available for RCP as well as other programs addressing the existing homes market.

# Section 4: Market Intervention Strategies and Policy Implications for Residential Contracting Programs

In this section, we describe RCP as implemented for program year 1999, then broaden the discussion to examine market intervention strategies and policy implications related to the residential contracting market. In addition, we discuss in this section policy issues related to under-served markets. Importantly, although current initiatives are aimed at transforming markets for residential contracting practices, these efforts are likely to reach a relatively limited group of market actors in the near term. Moreover, depending upon energy policy priorities, more traditional resource acquisition approaches may still be warranted to augment on-going market transformation initiatives.

## *4.1 The PY99 Residential Contractors Program*

The Residential Contractor Program is a statewide program implemented at each of the four California investor-owned utilities under the oversight of the California Board for Energy Efficiency (CBEE) in program year 1999 (PY99). The program offers incentives to contractors who attend training sessions and register either with the League of California Homeowners or the Electric and Gas Industries Association. Measures included in the program include: air conditioning diagnostics and maintenance, duct diagnostics and sealing, high efficiency furnace and air conditioning, high efficiency window, attic and wall insulation. Additional incentives for setback thermostats, fluorescent lighting, and low-flow showerheads are available if included with one of the larger measures above.

## *4.2 Considerations in Developing Market Intervention Strategies*

Energy efficiency policymakers have an array of intervention strategies at their disposal, including options that may be broadly classified as either "market transformation" or "resource procurement" options. In developing intervention strategies for energy efficiency, one must be mindful of both the magnitude of expected benefits, and the constraints posed by the structures of the target markets. Our analyses thus far have focused largely upon the market barriers that appear to prevent the more widespread adoption of energy efficiency products and services. We therefore add, below, the

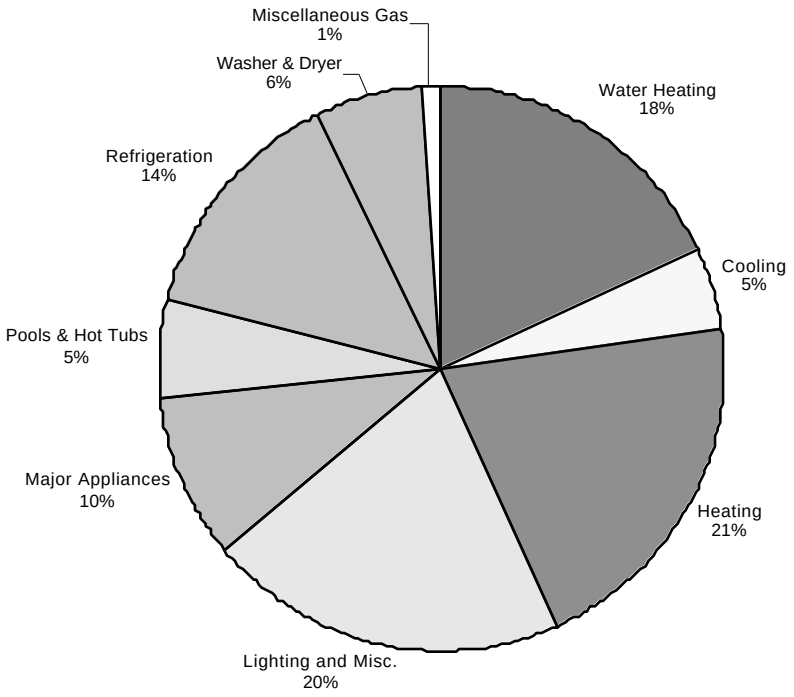
context of energy savings potential, followed by a discussion of broad policy options related to "resource procurement" and "market transformation" intervention approaches.

### *4.2.1 Energy Use in Context*

The California Energy Commission provides, in its ***1998 Baseline Energy Outlook***,[14] estimates of residential energy consumption by end-use. These values, depicted in Figure 4-1, show the relative importance of the different end-uses.[15] Heating, lighting/misc., and water heating, each account for close to 20% (+/-) of total gas and electric consumption in California. The remaining 40% of total energy consumption is comprised of (in approximate order of importance) refrigeration, major appliances, washer & dryer, pools and hot tubs, and cooling[16].

[14] California Energy Commission, 1998, ***1998 Baseline Energy Outlook***, Sacramento, CA.
[15] Values are for Btu content, based upon 1997 consumption estimates, with no accounting for production or transmission losses.
[16] Note that, although some end uses may be less significant than expected in terms of total consumption figures, they may factor in more significantly when one considers contributions to system-level peak coincident demand.

**Figure 4-1: California Residential Electric and Gas Consumption by End-use**




From these data, one can see that heating and cooling (combined) account for only one-quarter of the total residential energy consumption. Understanding that the heating and cooling end uses are traditionally most affected by the contracting trades (HVAC, windows, insulation), and assuming that the average distribution among end uses is roughly proportional to the total, this indicates that a large percentage of the total residential energy end use is not addressed by these market actors. Although contractors play a role in the specification of refrigerators and major appliances, for example, their influence is less significant than in the heating and cooling end uses.

An important unknown in the whole policy-level equation is where the ***energy savings potential*** actually lies, how cost effective it is to target these various areas of potential, and where to prioritize program intervention strategies. Absent such information, it is difficult to base policy decisions on total consumption figures -- it may turn out, for example, that the majority of cost-effective savings potential lies in heating and cooling

even though these end uses comprise only 25% of total consumption. A CBEE study, being performed by RLW Analytics, Inc. is currently underway to address these critical issues, including the various levels of energy savings potential related to residential end uses, and the energy efficiency potential that lies outside the heating and cooling end uses. This analysis will aid policy makers significantly in establishing end-use priorities and linking these priorities to specific program design options.

### *4.2.2 Market Transformation Strategies*

The goal of recent energy efficiency policy in California has been one of "market transformation," in which market intervention strategies seek to create self-sustaining private sector markets for energy efficiency products and services. This change in focus represents a shift away from past "resource acquisition" policy approaches and was necessitated, in large part, by the presence of abundant electric and gas capacity in California. This abundance of resources made it difficult to justify the cost effectiveness of near-term resource procurement initiatives.

Market transformation policy initiatives in California have also emphasized leveraging market forces to initiate change, rather than using large-scale subsidization of products to acquire energy efficiency purchases (as was done, historically, under resource procurement objectives). The Residential Contractor Program (RCP)[17], for example, strives to provide contractors with training and financial incentives that will enable them to make greater use of diagnostic practices and available energy efficiency products and services.

Because of their obvious importance in the residential marketplace, it is natural to begin market transformation efforts by focusing on contractors. The design of the RCP recognizes that contractors are responsible for the specification, installation, and maintenance of major energy consuming products in existing households. However, as highlighted throughout this report, the residential contractor marketplace is very complex, including many different markets with various niches. A change in one niche does not

[17] The RCP provides contractors with necessary training and provides lists of "eligible" contractors to interested customers. Customers are provided with information to aid in selecting a contractor, and a voucher that may be utilized to offset the cost of various energy efficiency contracting services.

necessarily transform the whole market. This suggests the need for multiple program interventions that are targeted at achieving specific objectives and will, in concert, result in the desired transformation of the overall residential contractor market for energy efficiency services.

Although the RCP provides financial incentives for lighting and water heating, training and financial incentives are primarily targeted at heating and cooling end uses. Importantly, many of the end uses that are less affected by residential contractors -- especially those that lie outside of the heating and cooling end uses -- are also affected by direct-consumer purchases and interaction with market actors other than residential contractors. To the extent that policy makers continue to rely upon market transformation strategies, it is therefore important that such strategies be coordinated. This coordination is necessary so that RCP efforts are augmented by, and do not compete with, initiatives that address retail outlets, do-it-yourselfers, upstream suppliers or manufacturers -- all of whom must be targeted if permanent market transformation is to be achieved.

### *4.2.3 Resource Procurement Strategies*

As noted above, the shift of energy efficiency policy objectives toward market transformation goals has, in recent years, replaced the more traditional DSM paradigm of resource acquisition. However, with the continued expansion of the California economy, some energy policy analysts and planners have highlighted a need to utilize energy efficiency resources as a means of addressing issues related to system reliability and capacity needs. Specifically, there are examples of localized transmission and distribution capacity issues where localized investments in energy efficiency may represent the least-cost solution. As such, although much of the current emphasis in the residential contractor markets has been upon market transformation, it may also be useful to utilize our understanding of the residential contractor market in identifying resource procurement approaches to supplement market transformation initiatives in this market.[18]

Importantly, there is nothing in the current movement toward encouraging market transformation that precludes planners from also encouraging general, or localized,

energy efficiency resource acquisition in the residential contractor market when it is justified. For example, if reliability issues become more acute[19], then it would be prudent to incorporate targeted incentives into the existing program that are tailored to maximize resource acquisition. Within the RCP program, for example, this would mean increasing incentives for those products and services that could deliver the most significant and lasting quantities of energy resources for the least cost.

Because of the diversity within the residential marketplace, it is clear that one policy approach will not reach all market niches. The CBEE must be prepared to develop a package of programs to meet the needs of all residential markets. While RCP is beginning to reach some niches, there are others where standard performance contracts, direct install, retail store rebates, education/training, or other approaches may be more successful.

### *4.3 Implications for Program Design*

Perhaps the most important message to result from the market characterization work undertaken to date is that one single program intervention is not going to work to transform this extremely diverse market. A wide array of creative market intervention strategies, including both market transformation and resource procurement approaches, may be required in order to effect changes in the residential contractor market[20]. Programmatic priorities include:

- Increasing consumer awareness
- Expanding the current RCP to include the broader contractor market
- Developing targeted incentives
- Expanding contractor training and certification
- Integrate additional technologies and services into RCP

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[18] In fact, the current methods for assessing cost effectiveness and calculating incentive levels for CBEE programs still reflects a resource-acquisition framework.
[19] This would likely manifest itself through either predicted increased probabilities of brownouts or predicted shortages of power in future years.
[20] See Wirtshafter et al, "Rethinking Performance-Based Measurement: Implications for Market Transformation Program Design." Published in the proceedings to the 1999 International Energy Program Evaluation Conference. Denver: August, 1999.

### *4.3.1 Increasing Consumer Awareness*

Low levels of consumer awareness represent a formidable barrier to increased consumer demand for energy efficient products and services. This suggests a need for program intervention strategies, in addition to financial incentives, that will heighten consumer awareness and overcome this barrier. A broad-based consumer awareness campaign is definitely required. However, given the extremely dispersed nature of the residential contracting market, it may also be productive to provide contractors with resources to educate consumers. Program intervention strategies along these lines could include:

- Contests for the best marketing plan,
- Cooperative advertising commitments,
- Support for the development of local or regional trade organizations committed to energy efficiency,
- Development of standard brochure text and graphics that contractors can print their name on and give to customers, and
- Internet-based resources providing information on higher efficiency options.

### *4.3.2 Expanding the Current RCP to Include the Broader Contractor Market*

Given the diversity of the contractor market, it is prudent to discuss how current programs address this diversity. This is particularly important should expansion of programs be desired. We discuss below the current focus of the RCP program with respect to targeting of program towards the various contractor types described above.

Some people envision RCP's objective as solely the promotion of a "whole-house energy service" industry. The package of incentives offered by RCP are thus to encourage development of a single contractor that can advise homeowners on all aspects of energy saving. Indeed, there are a few contractors who have reportedly focused their business development strategy towards building a whole-house service company. These contractors have the necessary skills and tools to provide these services and are now making good use of the utility incentives. Several have also targeted their client base to homeowners buying properties, combining the RCP program with the Energy Efficient Mortgage program to maximize the funds available.

The whole-house energy service niche will appeal to only a small fraction of today's contractors. Most contractors have neither the skill nor the desire to provide whole-house services. As Table 2.2 shows, most contractors specialize in one trade, with few having multiple licenses across the trades relevant for whole-house services. It is also unclear whether homeowner demand for this service can support a large industry of contractors.

Accordingly, RCP targets the individual trades to encourage the use of higher efficiency. Many of the existing RCP components are targeted at opening new business opportunities, within the existing trades, for innovative contractors who are willing to take risks and develop new ways of providing their services. The PY99 RCP promotes, for example, the development of new services (diagnostics leading to better AC maintenance, duct repairs, and air sealing) that have the potential to increase energy efficiency in many areas in California. These initiatives will appeal mostly to the cutting-edge contractors who see state-of-the-art approaches and quality service as selling points.

The issue that California policy makers must confront is whether appealing only to cutting-edge contractors is appropriate at this time. The assumption now in place appears to be that innovations adopted by the cutting edge contractors will trickle down to other contractors. As the concepts and practices adopted by the cutting edge become better known, other contractors will adopt the new ways because of market pressure. However, the critical issue for policy makers is how quickly they want to see this transformation take place. Most contractors are not easily persuaded to change their business approach or practices, and complete market transformation relying on a trickle down strategy may take more than a generation to be effected.

Policy planners therefore need to consider developing or expanding initiatives toward contractors who are not on the cutting edge of their field. The current incentives aimed at the top of the efficiency improvement ladder have little or no immediate effect on the vast majority of contractors. For instance, present incentives for double low-e windows have limited relevance to contractors still predominantly installing single paned windows. Similarly, contractors who remain skeptical of the viability of whole-house services need

more than the RCP incentives to be convinced to take the plunge into this service industry.

### *4.3.3 Developing Targeted Incentives*

While the RCP encourages the development of new business services, it should also keep an eye focused on more narrowly defined, shorter-term objectives -- such as altering standard practices for single measure types. Given the permanence of many of the investments now being made in existing homes in California (***i.e.,*** "lost opportunities"), it may not be prudent to ignore the more mainstream contractors while longer-term initiatives seek to influence the market leaders.

Future program initiatives will still need to address ways of bringing up the bottom of the market. Methods such as code improvements[21], training, and targeted incentives all can be used to influence these contractors. Targeting incentives to change the behavior of contractors using the least energy efficient methods does not necessarily call for lowering the bar for all contractors. It may instead involve understanding the segmentation in the marketplace. By understanding segmentation, we can create targeted incentives -- ones that affect the specific segment without creating large free riders. This strategy, used quite successfully by the airline industry to price seating, might offer one-time incentives to low-end window installers who attend an introductory seminar. These could be in the form of two or three coupon rebates for installing double paned windows where single paned windows still predominate. Continuing with windows, for example, it may be possible to identify geographic areas in which single-pane windows are still utilized. In these areas, it may be worth providing a limited-time offer, or a one-time offer, to window installers who utilize low-e windows.[22]

[21] Codes and standards are an important tool for improving energy efficiency in the home. They are particularly helpful in affecting the bottom end of the marketplace. Also the standards are important in the renovation market, where the new additions must be built to new-home standards. However, these codes must be periodically upgraded to remove the less efficient options, and they must be enforced. With respect to the RCP program, higher standards for windows and air conditioners would have the most effect on improving the overall efficiency.

[22] In this particular case, it may be more efficient and effective to raise code levels and enforcement to end the use of single paned windows.

Again, in applying these incentives, these initiatives should make use of market segmentation information as much as possible to reduce the degree to which free-riders dominate the participation rates. This free rider issue is a factor for windows, HVAC equipment, and other appliances. It is not so much the case for insulation, however. Because insulation incentives have been widely available, it is likely that most of the free-riders have already taken advantage of incentives. The opportunities that remain represent the least able, most difficult-to-reach applications. High incentives for retrofit applications may thus be justified and beneficial even though the marketplace for insulation appears fully developed.

Finally, with respect to incentives, we stress the fact that incentives normally make up a small and limited component of market transformation campaigns in other industries. When incentives are used, they are generally short-lived and utilized for a specific purpose. Rather than being the central focus of an approach, as they have been used in utility efforts, they tend to supplement the overall marketing campaign. We think that RCP should make more use of targeted incentives, those applicable to first-time contractors, or to expand market reach incentives targeted to under-served markets, and structure the incentives to be a part of a broader market awareness/product development campaign.

### *4.3.4 Expanding Contractor Training and Certification*

A large number of contractors are not using, and may not be familiar with, state-of-the-art energy efficiency measures and installation practices. Among the contractors interviewed during various phases of this project, there was a surprising lack of specific understanding of energy efficient methods and benefits. Training is generally viewed favorably, and most of the contractors we spoke to welcomed the opportunity to attend workshops on energy efficiency (although most requested that they be held at night or in the off-season). Training for contractors, in an on-going manner, should be considered in the following areas:

- State-of-the-art energy-efficient practices, including hands-on sessions;
- Calculating the benefits of energy efficiency for the customer's specific application;
- Communicating the benefits of energy efficiency to the customer; and

- Building a business strategy to provide whole-house services or other efficiency services new to that firm.

Certification remains an important step in raising the standards of all contractors. To be successful, the knowledgeable and experienced contractors in the marketplace need to be able to distinguish themselves from their less qualified competitors. However, to the typical untrained consumers, all contractors may appear to be knowledgeable. The development of certifications that recognize the training, experience, and knowledge of the contractors would be a useful way to differentiate contractors.

As part of this evaluation, we assessed the feasibility of a variety of certification options.[23] Findings from this assessment identified three general areas in which certification should provide coverage:

- Qualified businesses -- Two organizations in California, the League of California Homeowners (LCH) and the Electric Gas Industry Association (EGIA) certify that member businesses have the proper licenses, insurance, and (in the case of LCH) clean business records.
- Technical competence -- Certifies individuals on their training, work experience, references, and passage of written and/or hands-on examination. There are several national organizations that have, or are developing, certifications in the various fields, though none exactly covers the whole-house services field.
- Verification, Dispute Arbitration, and De-certification -- None of the existing certifications has detailed procedures for installation verification or removal of contractors who do not meet installation requirements.

There are two alternative choices available to policymakers in terms of where to direct the certification: the firm or the individual. Because consumers contact the firm, there is logic in certifying firms, however, as certification moves towards technical competence, including testing of skills and knowledge, certification at the firm level becomes

[23] Additional Research into Certification and Contractors' Attitudes: California Board for Energy Efficiency PY98 Residential Standard Performance Contract Program Evaluation" Wirtshafter Associates, Quakertown, PA 18951, December 1, 1998

problematic because of employee turnover. In all likelihood there will be a need to have both a firm-based certification and an individual-based certification.

Because the development of any new certification processes will require several years to implement, there is a need for the RCP program to provide some form of interim coverage. EGIA and LCH can provide the business qualification, and passage of the training session is a minimum standard for technical competence. However, stronger oversight to eliminate poorly performing firms and individuals needs to be added to the existing RCP participation process.

### *4.3.5 Integrating Additional Technologies and Services into RCP*

Additional opportunities for retrofitting existing homes are somewhat limited, especially with respect to areas where contractors have any influence. Areas that have potential for greater integration include:

- ***Attic fans and attic ventilation***—Cooling loads can be significantly reduced in many homes if proper attic ventilation is obtained. This measure should be done in conjunction with air sealing that minimizes the air leakage from the living space to the attic.
- ***Water heater replacement***—Change to a more efficient unit is possible, although this is almost always undertaken as an emergency replacement when the existing unit fails. It has been suggested by some that the need for a water heater replacement might be used as a catalyst for acquiring additional services.
- ***Pool and hot tubs—***There are savings to be realized in the pumps and heaters used by pools and spas. As Table 2.2 notes, these applications use five percent of the total energy in the home.

If the RCP program is to be a significant force for market transformation, then it must be able to accommodate and, in fact, encourage the inclusion of new products and measures. RCP should directly, or through an innovation generator such as the Third Party Initiative, actively encourage and support the development of new products, services, and delivery mechanisms that have the potential to make existing homes more

efficient. Such support could be provided in the form of marketing support, financial support, or product refinement.

One important area in which the utilities are in an excellent position to help, is in providing market research support and setting up performance monitoring. This last point is very important. Small, innovative firms with new products are likely to be constrained in their ability to devote the resources required to document results. Without these data, neither contractors nor customers can truly evaluate the value of innovative services. And without these data, it is also very hard for the planners to know whether the appropriate emphasis is being placed on various measures. Cooperative efforts among the utilities, EPA (Energy Star), and the National Labs are possible means for reducing this impediment and enhancing the diffusion of newer products and services in the contracting markets.

### *4.4 Policy Issues Related to Under-served RCP Market Segments*

Questions have been raised within the CBEE policy environment about the degree to which there exist under-served markets. To a large extent, concerns on this topic are related to equity issues that are beyond the scope of this report. We include below, however, our observations related to the current RCP and under-served markets.

#### *4.4.1 Under-served Customer Groups*

It is understandable that concerns for under-served markets be raised given the historic record of DSM where the wealthy and more educated homeowners, to the exclusion of others, historically dominated DSM programs. In those programs, the goal was to acquire resources and concentrating incentives on those most capable of adopting the new products and services was perhaps expedient, but did not fairly benefit under-served parties.

As the RCP develops, there will inevitably be an uneven rate of participation among various sectors of the residential population. It is a well-accepted theory of diffusion that word-of-mouth is the principal vehicle for the spread of new ideas. Thus, as a new product or service expands its market, new participants tend to be either spatially or demographically connected to earlier participants. Businesses exploit this segmentation

by purposely developing products in the most favorable environments first. It is only after a product has demonstrated itself in its base environment does it look to expand to new areas. As a service expands, businesses recognize the need to extend their market share by developing new customers outside of the traditional base areas, or new firms enter the market to fill the gap.

While it is too early at this point to assess whether any customer groups are under-served, this is obviously an area that will need to be tracked closely as the program matures and as complementary initiatives are developed. If differences in participation rates by various customer groups (based upon ethnicity, for example) are detected within geographic areas, this would suggest that marketing efforts must be retooled, and possibly recruitment of minority contractors increased.

### *4.4.2 Under-served Market Actors*

Within the residential contracting market, specifically, and market transformation initiatives, more generally, the issue expands to include the question of whether or not there are any market actors that remain under-served. Within the context of the RCP program, the first step in reaching under-served markets is the recruitment of new contractors. This is being addressed using a geographic information system analysis to identify areas in which contractors are not available to provide services. Once all geographic areas are served by participating contractors, the program will market to, and provided targeted outreach to any groups that are not participating in the program.

In assessing the fairness of market transformation policies such as RCP, policy makers must monitor the market transformation process, and adjust incentives, and shift strategies as market transformation proceeds. In this light, incentives must have the purpose of initiating markets, not subsidizing investment in areas where markets are already developed. When saturation levels meet a certain level in an area, administrators should have the flexibility to discontinue the rebates. The program should direct its incentives, marketing efforts, and contractor recruitment to areas not yet fully developed.

### *4.4.3 Under-served Housing Types*

The most difficult issue regarding under-served markets is likely to be reaching multifamily and mobile homes. Although the current RCP program appears to have received a significant number of completed vouchers from contractors working with mobile home owners, multifamily has had few contractors participate to date.

The building owner/tenant split incentive barrier remains an intractable obstacle in the move towards energy efficiency within tenant-occupied units. For the most part, building owners cannot recoup energy efficiency investments in the form of higher rental prices. Most potential tenants cannot properly evaluate the energy efficiency of a rental unit, nor can they translate relative efficiencies into monthly energy bill differences. The tight rental housing market in California makes it difficult for potential tenants to be choosy about energy efficiency. The current rental market is so favorable that most multifamily managers and owners have little concern about energy efficiency. The RCP multifamily approach uses a standard-performance contracting (SPC) model, and its current requirements may limit interest among multifamily managers and owners. This approach may not be applicable to all multifamily properties, and program planners may need to consider other initiatives.

Our focus group research uncovered a segment of property managers with a strong interest in efficiency education or training for their staff. These respondents reported feeling that the RCP style program did not apply to them or had their own reasons for preferring to move forward on their own. A distinct educational component is likely to be perceived as directly applicable to their firms, allowing market improvement in niches where the RCP-style approach was unsuccessful

Owners of mobile homes face their own set of barriers, primarily because the coaches they own are a depreciating asset, and because the unique design of their coaches tends to preclude the use of standardized energy efficiency practices and equipment. Many of the techniques, such as insulation and air infiltration reduction, require a different set of approaches in mobile homes. In addition, some of the equipment such as water heaters, furnaces, air conditioners, doors, and windows are not standard sizes and must be special-ordered. Perhaps more importantly, because most mobile homes depreciate in value over time, it is difficult for owners to justify making improvements or to

obtain loans to finance improvements. Most of the occupants of mobile homes are either young families or retired persons with little extra money to spend. Many of these households would qualify for the low-income programs, so that it seems logical to develop a coordinated effort with programs sponsored by the Low Income Governing Board (LIGB).

There is a need to tailor program elements to fit the mobile home market. By working with managers of mobile home parks, RCP could bypass the need to market to each individual coach owner. It will also be more efficient to retrofit a whole trailer park at one time. Some parks have reached a point where new electric load cannot be accommodated because distribution demand has reached its capacity. These same parks have untapped energy efficiency opportunities which, if undertaken, could postpone costly electric-grid upgrades. A trend in mobile parks is to replace coaches with permanent modular housing. This is a positive improvement for both housing and energy efficiency, and any RCP efforts should be positioned such that they do not stall this trend.

In selecting marketing approaches for the multifamily and mobile home market it is very likely that tailored incentives will be a necessity. Absent a tailored approach it is likely that the sizable barriers in these segments will prevent market development. The split incentives barrier will impede marketing directed at management and income constraints will depress market activity among consumers.

# Section 5: Summary of Significant Findings and Recommendations

As noted throughout this report, residential contractors play an important role in installing and maintaining building shell components, furnaces, air conditioners, water heaters, and lighting. Encouraging these contractors to promote and utilize more energy efficient products and practices is a logical approach. The design of the CBEE Residential Contractor Program concept, focusing on contractors to transform the market for energy efficiency in existing housing, reflects this concept.

While much of the information provided in this report is intended to serve as background information for program designers and policy makers seeking to understand the residential contracting market in greater detail, there are several significant findings and recommendations that are worth highlighting. To the extent that future energy efficiency initiatives that involve the residential contracting market can reflect these findings and recommendations, efforts to leverage this important market will be much more successful.

Significant findings from this study that should be borne in mind as policymakers and others endeavor to influence the residential contracting market are noted below. Based upon each significant finding, we provide our recommendations for policymakers interested in addressing energy efficiency issues in the residential contracting market.

### *5.1 Low Consumer Demand*

- ***Finding: Consumer demand for efficient products and services in the residential contracting market is low.***

- ***Recommendation: Develop and implement an aggressive marketing campaign to increase consumer awareness of energy efficiency opportunities related to the use of residential contractors.***

Incentives alone are unlikely to be sufficient to transform the residential contracting market. Contractors have cited low consumer demand for energy efficient products and services as a barrier to undertaking more work in this area. Similarly, CBEE-sponsored research has documented an extremely low level of awareness among consumers. And yet, at the same time, consumers report that they feel they are relatively informed in areas of energy efficiency opportunities. Clearly, if any policy initiatives are going to succeed in this market, it is necessary to first undertake broad-based efforts to educate and challenge consumers to find out if they really have as good of an understanding of energy efficiency options as they believe they have.

### *5.2 Diversity of Contracting Markets*

- ***Finding: Residential contracting markets are extremely diverse and fragmented, both in scope and business practices.***

- ***Recommendation: On-going market research should be undertaken to understand the diverse array of contracting markets and practices.***

It is important for everyone to understand that market transformation within the residential contracting market requires a different focus and strategy than did previous DSM programs designed to acquire resources. The success of RCP and other initiatives in this market will depend on the ability of program planners to understand these markets and develop creative ways to work with contractors and their customers.

### *5.3 Limited Reach of Current RCP Initiative*

- ***Finding: The current RCP design is likely to reach only limited portions of the market and take considerable time to transform the residential contracting market, thereby necessitating additional program initiatives to address the complete market.***

- ***Recommendation: Expand current initiatives to educate and train a broad array of residential contractors and motivate business owners.***

Awareness and understanding of specific benefits of higher efficiency products among the broad residential contracting market is quite low. Current efforts to train contractors in areas promoted by the RCP are valuable. These efforts have so far only reached a small segment of the contractor marketplace. RCP should expand its efforts in training to reach the broader contractor market as well. This will likely require a variety of training approaches coupled with incentives, consumer education and promotion, market development support, and equipment acquisition assistance. These broader initiatives are justified because of the lost opportunities associated with the installation of inefficient measures. Furthermore, these same activities will capture energy efficiency resources should they be needed in the near term due to reliability and environmental concerns.

- ***Recommendation: Develop programs that attract the broad masses of contractors, even if these programs do not require these contractors to reach absolute state-of-the-art.***

  There are large segments of the current contractor marketplace that will not be influenced by incentives for state-of-the-art measures and services. In many of these segments, contractor behavior is driven more by consumer demand so these efforts must be coordinated with the building of consumer awareness. Because there are so many sub-markets to consider, it is important for RCP or other initiatives to offer a variety of programs to target specific niches. Designing market stimulation programs for this end of the sector can be done while maintaining other incentives for the state-of-the-art measures if market differentiation can be exploited. Programs for each specific market must be targeted to their respective markets, with respect to the advertising used, the messages conveyed, and the types of incentives offered.

- ***Recommendation: Target programs toward under-served markets where energy efficiency opportunities remain untapped.***

  The RCP and other programs should investigate if program participation is developing in all geographic areas, socio-economic sectors, and housing types. Programs should ensure that market outreach and incentives are tailored to these segments to

attract the interest of contractors and customers. Additional support in developing these markets may be needed to overcome existing barriers.

### *5.4 Limited Incentive for Some Trades to Participate in RCP*

- ***Finding: Some contractor groups, particularly electricians and plumbers, have little incentive to participate in RCP.***

- ***Recommendation: Expand the current eligible list of measures to include several measures attractive to electricians and plumbers***.

  High efficiency hardwired lighting, pool and spa pumps and heater upgrades, high efficiency water heaters are all good candidates for expansion of the RCP program. Attic ventilation, when it is done in concert with sealing of the attic area, may also be included in RCP.

### *5.5 Coordination with Parallel Initiatives*

- ***Finding: In some residential contracting markets, contractors play less of a dominant role in consumer decision-making.***

- ***Recommendation: Ensure that necessary overlaps are in place with retail programs and other initiatives.***

  In products and services where contractors play a relatively minor role, as compared with the role played by do-it-yourself, handyman, or retail markets (e.g., lighting, and water heating), policymakers should ensure that these markets are adequately addressed through complementary program initiatives.

### *5.6 Promotion of Emerging Products and Services*

- ***Finding: The need for, and the benefits of, newer and less familiar products and services such as duct diagnostic service are not well understood by consumers or contractors.***

- ***<u>Recommendation</u>: Conduct an independent assessment of the potential energy savings and related benefits resulting from duct diagnostic services.***

  If diagnostic services and related energy efficiency services are to emerge as a self-sustaining industry, then evidence of their value must be collected and disseminated to consumers and to contractors. One possibility would be to facilitate product and service diffusion through field and laboratory testing, with public reporting of the results. Utilities and national labs have unique specialized skills with regard to performance monitoring that can provide valuable unbiased information to interested consumers, much along the lines of ***Consumer Reports***, but with a focus on efficiency.