Understanding the Residential Contracting Market and Implications for Market Transformation Program Design

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ABSTRACT
Private-sector residential contractors, ranging from licensed HVAC technicians and general contractors to informal home repair persons, can have a significant influence in a variety of energy efficiency decisions made by homeowners. As such, understanding the structure of these markets, as well as the key business models, is an important step in developing program interventions targeting these market actors. This paper provides an in-depth review of research efforts undertaken in California on behalf of the California Board for Energy Efficiency (CBEE) to understand and characterize the highly complex residential contracting market. This work has documented the overall complexity of this market and highlighted the fact that there is not one single residential contracting market. Rather, this is an industry that is highly fragmented by specialty areas and with minimal overlap among these specialties.

Overview

This paper 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. 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.

There are many markets within the residential contracting arena -- both on the consumer demand-side, and on the contractor supply-side of the market. Each presents unique market barriers to increasing the use of energy efficient practices and equipment. The Residential Contractor Program (RCP) has been developed and implemented by the California

investor-owned utilities as a vehicle for addressing market transformation opportunities in this market.

Before potential intervention strategies can be discussed, it is important to understand the structure and dynamics of the target marketplace. In this paper, we endeavor to:

- Identify the predominant efficiency measures that are relevant to the RCP program;
- Highlight the diversity of consumer markets for energy efficiency contracting services;
- Highlight the diversity of retrofit contracting service providers;
- Highlight important barriers to energy efficiency from the perspective of consumers;
- Highlight important barriers to energy efficiency from the perspective of contractors;
- Identify important policy implications based upon this knowledge of the residential contracting market.

The findings presented here are derived from a baseline survey of residential consumers in existing single family homes, a baseline survey of contractors active in the residential retrofit market, analyses of California state license data, and qualitative research with both contractors and consumers. This research was conducted over the period 1998-1999.

Energy Efficiency Measures Relevant to the Residential Retrofit Contracting Market

The RCP program has been developed with an emphasis on targeting the following areas of opportunity for retrofit work to improve household energy efficiency:

- *HVAC equipment installation and maintenance* -- replace old or broken equipment with more efficient and properly sized models; maintenance that provides correct pressure and airflow.
- *Sealing and weatherizing homes to reduce outside air infiltration* -- The use of blower door diagnostics, along with remedial weatherstripping and caulking; air quality and combustion safety testing.
- *Duct redesign, repair, balancing, and leakage reduction* -- repair 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 installation practices or by physical features of the site.
- *Energy efficient windows* -- Replacement of existing windows with higher efficiency models.
- *Energy efficient lighting* -- Opportunities exist for upgrading both indoor and outdoor lighting, especially the common areas of multifamily.
- *Pipe insulation and efficient showerheads* -- These measures are widely applicable in the retrofit market, providing easily installed and low cost opportunities for energy efficiency retrofits.

RCP encourages retrofits of these measures in existing single family, multifamily, and mobile homes in California. RCP is administered by Pacific Gas and Electric, San Diego Gas and Electric, Southern California Edison, and Southern California Gas companies.

Consumer Markets for Residential Retrofit Contracting Services

With more than 11,827,000 housing units in California in 1996, (US Census, 1996), the potential market for energy efficiency appears to be inexhaustible. 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. 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, see US Census (1999). These numbers alone indicate significant differences in market potential from one housing type segment to another for the sale of energy efficient products and services.

Beyond these figures though, it is critical to recognize 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 not only by housing type, but also by the type of energy efficiency product or service required (HVAC, insulation, windows, etc..). 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 neighborhood, all work together to determine the real market potential for energy efficiency of a housing unit. 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. 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. 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. Thus, a diverse set of factors influence whether or not a home is good candidate for energy efficiency upgrades.

Size of the Residential Retrofit Contracting Service Providers Market

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. For the purposes of characterizing and quantifying the gross size of the contractor market, state license data maintained by The Contractors State Licensing Board (CSLB) were analyzed. Our research suggests that there is a relatively high rate of turnover among contracting businesses, and that contractors tend to focus on either residential work or commercial work, with relatively few firms targeting both residential and non-residential markets. Gross contractor numbers in the CSLB database were therefor adjusted to account

for business turnover and to eliminate contractors strictly involved in non-residential work. Table 1 shows the estimated number of contractors working in the residential market in California for five key contracting specialties relevant to RCP energy efficiency market transformation efforts.

Table 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	% Providing Residential Retrofit Services	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

Overlap in Key Licensing Classifications

A certain proportion of contractors hold multiple licenses, reflecting their particular specialty areas and depth of capabilities. To assess the prevalence of multiple licensing, and to investigate the degree to which current market actors appear to be offering bundled, comprehensive, retrofit services, the CSLB data was reviewed in detail for three key contractor groups: HVAC, glazing, and insulation. Table 2, below, summarizes the findings in this area.

This analysis of the CSLB records indicated that there is 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. The most common pattern of dual licensing is the practice of holding a general contracting license in addition to one or more specialty licenses.

Table 2: Patterns of Multiple Licensing Among Selected Residential Contractor Trades

Primary License Category	Proportion with General Contracting License	Next most common licenses (percentage of primary licensees also holding 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%)

These data reinforce other information suggesting that, when it comes to efficiency-related services, existing contractor businesses tend to offer a narrow range of services and seldom have the staff or capabilities to provide a comprehensive set of efficiency-improving upgrades as part of a bundled service offering. Confirming this, the Residential Contractor Baseline Survey, discussed below, found that fewer than two percent of contractors in these trades provide what have been termed "whole-house" or "house doctoring" inspections. 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.

Contractor Perspectives: Barriers to Energy Efficiency Sales

To further examine the population of contractors serving the residential retrofit market, a statewide survey of California contractors was undertaken. This Residential Contractor Baseline Survey was used to establish a quantifiable assessment of the baseline practices and attitudes, related to energy efficiency, on the part of selected contractors who are providing services to the existing housing market. A stratified random sample was selected from five license categories considered most relevant to the Residential Contractor Program: HVAC, glazing, insulation, electrical, and general contracting. A total of 444 contractors met the eligibility requirements of the study and completed the telephone survey.

Important Factors Affecting Energy Efficiency Installations

One of the most dramatic findings of this baseline study is the weak demand, overall, for high energy efficiency options in the residential market. Low consumer demand appears to be a prevalent condition facing contractors who are in a position to promote energy efficiency in the residential retrofit market. For example, seven out of ten HVAC contractors reported that fewer than ten percent of their customers request SEER of 12 or better for air conditioners. Similarly, one-half of the contractors providing duct services indicated that consumer demand for these services is almost non-existent; nearly one out of five indicated

that they had seen no consumer demand at all. Likewise, lighting contractors reported very limited consumer demand for higher efficiency lighting alternatives. For many contractors then, the key issue impeding greater sales of energy efficient measures is a pervasive lack of market demand for these products and services.

Certain portions of the market diverge from this overall pattern. In marked contrast to the above, it is reported that approximately half of retrofit window consumers express an interest in energy efficient products. This information suggests that these product categories are in different phases of diffusion in the residential marketplace. Interestingly though, only one-third of the windows contractors indicated an awareness of Energy Star windows and certain efficiency features are not widespread in the market. There appears to be greater market support for higher efficiency products in the windows markets as compared to other end-uses, both in terms of levels of consumer demand and in contractor support for the products.

Residential contractors from all trades feel that the most important factors preventing contractors from providing more energy efficient equipment and services are the lack of consumer demand and the higher cost or unfavorable economics of the high efficiency options. 'Equipment availability' and 'equipment reliability and performance' were not significant market barriers in any of the trades. Table 3 summarizes the results for this question by each contractor specialty addressed in this survey.

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

Barrier	HVAC	Ducts	Windows	Insulation	Weather -ization	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%

It is interesting that cost factors are the largest perceived barrier for HVAC and windows, and lack of consumer demand is the primary barrier for all other service types. It is

also noteworthy that a large proportion of window contractors feels there are no significant barriers impeding sales of energy efficient windows.

Contractors generally attribute low consumer demand to the high cost to purchase and install higher efficiency equipment. While many of these respondents see the first-cost barrier as being important in and of itself, some also feel that the cost is high relative to annual savings. However, contractor knowledge on payback is limited; most contractors either do not know the simple paybacks (i.e., the period of time required for incremental measure costs to be paid back by energy savings) for major items, or see the paybacks as being greater than 5 years for major energy efficiency measures.

Further details on market conditions for several contractor trades are highlighted below.

Industry-Specific Findings: HVAC

Sales of heating and cooling systems strongly trend toward the less energy efficient systems in the retrofit market. Furnaces with lower energy efficiency ratings are predominant: the large majority of retrofit furnaces (82%) have AFUE ratings at or below 84%. Air conditioning system efficiency levels are similarly close to the lowest allowable levels. The lowest SEER rating (10) is installed in nearly two-thirds of retrofits. As mentioned above, consumer demand for high efficiency systems is low: over 70% of the contractors interviewed indicated that fewer than one in ten of their retrofit consumers request air conditioning systems with SEER ratings of 12 or better.

Most HVAC equipment is purchased through wholesalers/distributors. For the most part, higher efficiency equipment is readily available and equipment availability is not a primary barrier to increased market adoption.

Industry-Specific Findings: Duct Services

Diagnostic equipment is not currently being used by most of the contractors offering duct services to the residential retrofit market. Fewer than half owns any diagnostic equipment and, among those owning such equipment, utilization tends to be low. Visual inspection is the most prevalent method of identifying duct service needs. Among respondents who offer duct repair and/or sealing, 80% complete a visual inspection to determine if services are needed. Only 22% report that they use diagnostic testing equipment at all. Fewer than one in five of those who do own diagnostic equipment, generally viewed as providing results superior to visual inspection, report that they routinely use it on all their jobs.

Flex duct is by far the most common duct type used in both single family and multi-family homes. This material was reportedly used in 81% of jobs completed by respondents in 1998. Duct tape is by far the most commonly used material in sealing ducts.

Lack of consumer demand is the critical market barrier to increased penetration of duct sealing and related services. The baseline data indicate that more than half of the contractors who offer duct diagnostics and sealing see little or no consumer-initiated demand for these

services, indicating that consumers are not aware of the economic benefits that can result from duct repairs.

Industry-Specific Findings: Windows

Double-paned windows seem to be the overwhelming choice for contractors, as they are installed by over 95% of the contractors surveyed and account for 77% of the windows installed. Triple-paned windows are virtually unused in the retrofit market. Over 80% of those surveyed indicate installing both vinyl and aluminum window frames, with vinyl accounting for 49% of the windows installed and aluminum accounting for 29%. Untreated glass is preferred to treated glass, being installed about 60% of the time as contrasted to the less used low-e glass (33%) and double low-e glass (5%).

As compared to the other contractor trades we interviewed, this group of contractors is most likely to feel that there are no significant barriers preventing them from selling energy efficient products. A significant number of window contractors (55%) feel that energy efficient windows are superior products to their lower efficiency counterparts for non-efficiency (e.g., aesthetics) as well as efficiency-related reasons.

Even though windows make up a large part of EPA's Energy Star program, only 30% of the respondents installing windows indicate that they are aware of this EPA program. While those who were aware of the program indicate that over 60% of their window sales are certified, the lack of greater Energy Star awareness is an obvious concern. Nearly all windows are purchased directly through manufacturers; this suggests that manufacturers are not yet promoting qualifying products as Energy Star windows.

Industry-Specific Findings: Insulation

There are few insulation contractors who are doing work in the residential retrofit market. The small number of providers of this service is no doubt reflective of significant market barriers either limiting the potential market size or depressing the profitability of business operations. Data collected in this baseline survey indicate that contractors feel that the most significant barrier to insulation retrofits is cost rather than limited technical potential. Respondents indicate that they thought half of the existing homes still need insulation upgrades. Among those homes where the contractors had recommended additional insulation but the homeowner had elected not to have the work done, the key impediment was cost.

Most of the retrofit work addresses attic or ceiling insulation; approximately 60% of the insulation retrofitted in 1998 was of this type. The average R-value of insulation added to single family attics is 20, while the average for basements (where applicable) is 18. The average R-value of insulation added to multifamily attics is 21, while the average for basements is 19. Title 24 does influence retrofit jobs and respondents report that 40% of consumers request that their homes be upgraded to Title 24 levels without any marketing push from the contractor.

Industry-Specific Findings: Lighting

Contractors also play a role in installing new lighting, particularly in room additions and kitchen remodels. Over 30% of the surveyed contractors who install lighting indicate that more than half of the 4- or 8-foot fluorescent fixtures they installed were T-8s with electronic ballasts. Almost 50% say that less than half of their installations involved these technologies, while 20% say they didn't know. Only 6% of the contractors say that over half the indoor fixtures they installed were compact fluorescents, 67% say less than half, and 27% do not know. Nearly 20% of the contractors indicate that over half of the outdoor security fixtures they installed were fluorescent, low-pressure sodium, or metal halide, 56% say less than half, and 25% do not know.

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 report very low consumer demand among their customers; this includes 40% who have never had customers request energy efficient lighting. As is typical for other end uses, cost is perceived as a primary factor contributing to the lack of demand.

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 report that they do not know what is the likely payback period for energy efficient lighting in homes. This low level of knowledge among potential product specifiers certainly reduces baseline levels of marketing and promotion of energy efficient options.

Homeowner Perspectives: Barriers to Energy Efficiency

In order to develop baseline data for consumers as well as contractors, a separate telephone survey was conducted with 400 homeowners in late 1999 (ODC and Wirtshafter Associates, 1999). This section provides a summary of the key overall findings resulting from this RCP Consumer Baseline Survey.

Homeowner Attitudes Toward Energy Efficiency

An interesting finding, in light of the information provided from the contractors, is that homeowners in this baseline survey reported that energy efficiency is important to them. Participants in this research study rated their knowledge of ways to save energy in their homes and their overall efforts to save energy in their homes significantly higher than did respondents in the earlier CBEE Baseline Study on Public Awareness and Attitudes Toward Energy Efficiency (Hagler Bailly (1999)). Respondents to this more recent study also indicated that energy costs were important in relation to overall household expenses and over fifty percent indicated that they were interested in making home improvements that will

increase energy efficiency, comfort, or health or safety. Furthermore, nearly one-half indicated that a whole-house approach to energy efficiency sounded cost effective.[1]

Despite this stated interest in energy efficiency, the majority of single family homeowners do not feel that they 'probably need' any given energy efficiency improvement evaluated in this study. For example, fewer than one-quarter of the respondents felt that specific HVAC and duct measures targeted by SPC were 'probably needed' in their own homes. This included duct testing, air conditioning system tune-ups, installing a more efficient furnace, and diagnostics and service to their heating and cooling systems. Duct sealing and testing was least likely among HVAC-related services to be perceived as needed in the consumer's own home. This low level of interest reflected respondent beliefs about the applicability of the service to their own home, not their opinion about the value of the service in general. In fact, a large majority of respondents believed that duct sealing to be justified in cases where tests showed leakage of fifteen percent or more. These survey responses may indicate that, in many cases, homeowners are not aware of any particular efficiency needs in their homes - at the same time that they feel that they are quite knowledgeable about energy efficiency. If this is the case, improved information may alter consumer perceptions about their home efficiency and increase their probability of adopting more efficiency improvements.

The measures which homeowners were most likely to believe were needed in their own homes were energy efficient windows (42%) and attic and wall insulation (30% and 26%, respectively). These measures, then, appear to have achieved a different level of consumer appreciation in the retrofit market as compared to other options evaluated in this research. The needs for transforming these markets may hinge less on informational support than is the case for HVAC, duct, and lighting measures.

Penetration of Efficiency Measures in Existing Homes

According to the respondents in this baseline survey, several energy efficiency measures have already been installed in at least one-fifth of the existing single family homes in California. The most widespread of these is the low flow showerhead. Table 4, below, summarizes the data on prior adoption of efficiency measures.

Homeowners were also asked about their reasons for installing new equipment. The most frequently mentioned reason for adding insulation and HVAC equipment is to improve occupant comfort while windows are typically added to increase the amount of natural light brought into a home or because of a home addition. Energy efficiency generally was not reported to be the primary motivator for adding new equipment of this type, yet respondents indicated it is the most common concern once the decision to add new equipment is made. While this finding is at odds with the contractor feedback suggesting that budgetary concerns

[1] The following five measures were described as part of a ìwhole houseî approach to energy efficiency: testing and sealing ducts; sizing heating and cooling units properly; installing a programmable thermostat; putting in energy efficient windows; and insulating ceilings and walls.

are paramount, it seems likely that energy efficiency is a meaningful consideration in many consumer decisions.

Table 4: Market Penetration of Selected Efficiency Measures

Efficiency Measure	Penetration in SF Homes (self-reported data)
Low flow showerhead	38%
Energy efficient water heater	22%
Pipe insulation	22%
Fluorescent fixtures	22%
Compact fluorescent bulbs	21%
Energy efficient windows	20%

Energy Services Marketing

The survey data suggest that there is limited marketing of the whole-house concept occurring at the present time. When efficiency investments are promoted, it is usually in a less comprehensive approach. For example, homeowners replacing or adding HVAC equipment report that contractors most frequently mention the need to properly size equipment (58% of the time) and also frequently recommend installing a programmable or set-back thermostat (51% of the time). Duct testing was recommended about one-third of the time. These consumers report that contractor marketing of other, more comprehensive services (such as replacing windows or adding insulation to permit downsizing of HVAC equipment) was relatively uncommon.

Homeowner Awareness of Residential Contractor Program

At the time of this survey, very few residential homeowners were aware of the Residential Contractor Program (RCP). Awareness levels ranged from five to fifteen percent across the service areas of the administering utilities. Furthermore, many customers claiming to be aware of the program were unable to give any specific information about it. Homeowners were also largely unaware of the roles played by the Electric and Gas Industries Association (EGIA) or the League of California Homeowners in the RCP.

Higher awareness levels would have been a surprising finding at the time of this research as the level of marketing in 1999 had been deliberately limited while contractor training and approvals were addressed. It seems clear that increased marketing, along with increased consumer awareness, would be likely to increase the level of consumer demand for the products and services targeted by the Residential Contractor Program in light of the findings summarized above.

Conclusion

As noted at the outset of this paper, 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 for market transformation efforts focused on the residential retrofit market. 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.

It is apparent from this research that a number of barriers are affecting the adoption of, and even the promotion of, energy efficiency options in the retrofit marketplace. A majority of contractors perceive that there is low consumer demand for energy efficiency services and products, and that "unfavorable economics" constitute a major barrier in this regard. This status is reflected in the lower efficiency of equipment and measures being installed in much of the retrofit market. Demand for high efficiency options seems to be weakest in the duct services, lighting, water heating and HVAC markets. Marketing of energy efficient windows appears more successful at present.

Our surveys confirmed that most consumers do not perceive a need for HVAC efficiency services -- tune-ups or duct testing -- indicating that market transformation efforts may require that a substantial emphasis be placed upon educating consumers in this area. On the other hand, consumers indicate greater expectations that their homes would benefit from other energy efficiency products, especially windows and insulation.

In addition to establishing that market acceptance of products and services varies, this research has also documented that the large majority of contractors serving the residential market are narrowly specialized. This situation is so pervasive that it seems unlikely that more comprehensive, whole-house service delivery will exert any sizable influence in the marketplace any time soon. Consequently, changes in efficiency-related practices are likely to occur trade by trade, with market transformation advancing at different rates, and confronting different barriers in each sub-market. Program interventions, then, will need to be customized to each of the trades to effectively address their unique needs and characteristics. In the near term, there actually may be more convergence in program tactics to address common market barriers identified in this baseline work - namely, public information and other consumer-directed stimuli to ratchet up consumer demand for high efficiency products and services and to increase awareness of RCP. Over time, the unique market diffusion characteristics of each specialty market will likely necessitate that the program designs evolve into increasingly distinct market transformation initiatives.

A great of deal of information has been collected on this diverse market. The challenge that remains for program administrators and policymakers is to develop programs that address the diversity of this market while, at the same time, retaining a program that is easy for customers and contractors to understand and utilize.

References

Hagler Bailly Consulting (1999), CBEE Baseline Study on Public Awareness and Attitudes Toward Energy Efficiency - Final Report, June 1999.

ODC and Wirtshafter Associates, Inc. (1999), Residential Contractor Program Market Assessment and Evaluation Study; Single Family Customer Baseline Survey, prepared for CBEE and SCE, December, 1999.

U.S. Census (1996), *Historical Census of Housing Tables: Units in Structure* Population Estimates Program, Population Division,. US. Census Bureau, Washington DC.

U.S. Census (1999), 1990 *Decennial Census of Housing Tables*,. US. Census Bureau, Washington DC., from Website.

Wirtshafter Associates, Inc., Energy Market Innovations, Inc., Kreitler Research & Consulting, and Skumatz Economic Research Associates - V1 (2000), "Report of the Residential Contractor Program Evaluation, Volume 1: Phase I Residential Contractor Program Market Assessment," Prepared for CBEE and PG&E, March, 2000.

Wirtshafter Associates, Inc., Energy Market Innovations, Inc., Kreitler Research & Consulting, and Skumatz Economic Research Associates - V2 (2000), "Report of the Residential Contractor Program Evaluation, Volume 2: California Residential Retrofit and Repair Baseline Contractor Survey Summary Report," Prepared for CBEE and PG&E, March, 2000.

Wirtshafter Associates and International Communications Research (ICR), 'Report of the Residential Contractor Program Evaluation, Volume 3: Residential Retrofit and Repair Baseline Contractor Survey; Appendix A: Survey Instrument and Data Dictionary,' March 2000.

Wirtshafter Associates and International Communications Research (ICR), 'Report of the Residential Contractor Program Evaluation, Volume 4: Contractor Baseline Survey Banners,' March 2000.