EVALUATION OF THE 1998 THIRD PARTY INITIATIVES PROGRAM

FINAL REPORT

Prepared for

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To: Recipient

From: Derrick Rebello

Re: Third Party Initiative Final Report

The Third Party Initiative (TPI) report contains the results of Quantum Consulting's Evaluation of the Third Party Initiative program. The report is compromised of two primary sections, a process evaluation of the program, and individual assessments of 13 different TPI projects. In total the report contains 17 chapters. The first two chapters contain the executive summary and introduction for the report. Chapter 3 presents results of the process evaluation. Chapter 4 describes the market assessment methodology used for each of the individual project assessments. Chapters 5-17 contain the individual project assessments.

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TPI Final Report Table of Contents

1. EXECUTIVE SUMMARY

Highlights of the initial evaluation of the Third Party Initiative (TPI) program are presented in this Executive Summary.[1] The study entailed an evaluation of the TPI process and an initial assessment of the innovativeness and potential effectiveness of 13 of the 32 initial TPI projects.[2] In this initial evaluation, two aspects of the TPI program were stressed:

- *The success of the TPI program in meeting implementation goals.* The characteristics of a successful program were identified to assist in future TPI program planning and implementation efforts. The program's process evaluation drew from reviews of program and project documentation, interviews with program and project managers, and focus groups with project sponsors.

- *The potential effectiveness of each TPI project.* The estimated potential for each project to affect its market was based on a review of project documents, examinations of related projects, interviews with project managers, and the expertise of the project team.[3] The nature of these assessments is process-focused, as each sponsor was responsible for evaluating the cost-effectiveness and market effects of their own project. Each assessment was accomplished by conducting mini-market-characterizations of the targeted industry, in which:
  - barriers to market development, and their relative severity, were identified for each market participant, in each target market;
  - possible intervention strategies were linked to each market participant/barrier combination, and the importance of each intervention strategy in overcoming each market barrier was assessed;
  - key features of each TPI program, as well as key features of past, current and planned programs designed to stimulate the development of the targeted market, were linked to each market participant/barrier/intervention combination, and their potential effectiveness was assessed;
  - an assessment of the potential effectiveness and innovativeness of each TPI program was made by examining the extent to which the TPI program

[1] Each utility distribution company (UDC) implemented the TPI program individually, although there were similarities across utilities. In effect there were four programs, one in each UDC service territory.

[2] While 32 projects were funded throughout the state, only 21 were unique (i.e., six projects were offered by more than one UDC). Of the 21, 13 were selected for thorough evaluation. "Projects" refer to the activities carried out by each sponsor, within a UDC TPI program. Exhibit 1-1 presents a brief description of all 21 projects.

[3] The project team consisted of individuals with extensive experience in market transformation program development, refinement and assessment, including Dr. Michael Sedmak, Dr. Lori Megdal, Dr. Shel Feldman, Dr. Philippus Willems, Dr. Derrick Rebello, and Ms. Sheryl Curtsinger.

interventions addressed important barriers, and the relationship between the TPI program and other public and private sector initiatives.[4]

The logical next step in any market transformation program assessment would be the identification and tracking of key market effects indicators (again, linked to interventions/barriers/participants), so that the longer-term success of the program in question could be evaluated. Due both to the short duration of the TPI programs and the available evaluation project resources, in-depth market effects assessments were beyond the scope of the present project.

With this overview, a summary of the key strengths of the TPI program, and recommendations for enhancement, are presented in Section 1.1. Highlights of the assessment of the 13 projects are presented in Section 1.2.

1.1 TPI PROGRAM STRENGTHS AND RECOMMENDATIONS FOR ENHANCEMENT

The TPI program was originally conceived as a way to diversify energy-efficiency (EE) program offerings, by developing innovative and cost-effective EE programs that would complement California's efforts to transform energy efficiency markets. The key strengths of the TPI program are as follows:

- The TPI Program enlarges the pool of program design and implementation skills beyond that of the utility distribution companies (UDCs) and "mainstream" participants in the California Board of Energy Efficiency (CBEE) advisory processes for planning and implementation.[5] It allows members of the energy efficiency industry the opportunity to be creative in promoting technologies (and services) that might not otherwise receive support.

- If used as training ground, the TPI concept provides an opportunity to test newer or riskier concepts. These concepts, if proven to be successful in what are essentially pilot projects, could be rolled into larger UDC program offerings. Some of the successful 1998 TPI projects have already been rolled into the 1999 UDC programs.

On the basis of this initial evaluation of the TPI program, third-party initiatives have the potential to successfully enhance California's market transformation efforts. As with all new programs, however, there are opportunities for refinement in the TPI program. Some of the highest potential opportunities are presented below.

- *Provide Market Characterization Results to Potential Program Designers, Implementors and Administrators.* Providing clear, concise and relevant market characterization studies

[4] Cost-effectiveness and impact evaluations were the responsibility of each project sponsor as part of their final project reports. The majority of the final reports were not completed before the evaluation; therefore we are unable to comment of cost-effectiveness and market effects. The quality the reports received reinforced the evaluation team's recommendation to separate implementation and evaluation activities, for the individual projects.

[5] The UDCs are Pacific Gas & Electric (PG&E), Southern California Edison (SCE), San Diego Gas & Electric (SDG&E), and Southern California Gas (SoCalGas).

to all interested parties would improve the quality of proposals and projects by giving clear direction to EE product and service opportunities. Detailed market characterizations serve multiple purposes.

- First, they would establish clear direction for entrepreneurial opportunities both within and outside of the TPI program. By providing a clear picture of the EE landscape, market uncertainty can be reduced if transparent needs (gaps) are identified. In addition, providing the market characterizations will serve as an educational tool to the uninitiated and a focus for opportunity for the more informed.
- Second, within the TPI framework, determination of which projects are innovative and have potential to be effective is made easier. Again, armed with integrated descriptions of the EE industries in question, the program administrators will have an easier task of identifying projects that have a higher probability of being effective.
- Third, detailed market characterizations have the additional benefit of assisting the UDCs in developing their own programs by providing clear focus on market transformation opportunities.

- *Enhance the RFP and Selection Processes.* There are four key recommendations for improving the RFP and selection process.
  - *Develop a Consistent RFP Schedule.* Development of a firm RFP schedule would allow respondents additional time to conduct background research, formulate potentially innovative and effective strategies, and prepare effective implementation proposals. This is particularly important for those potential participants who are not well versed in proposal writing or may face bureaucratic hurdles to completing proposals quickly.
  - *Develop a Broader List of RFP Recipients.* Every sponsor in the initial phase of TPI projects either had worked for the UDCs in the past or was working for the UDCs at the time the TPI RFP was released. To ensure that TPI participation is not limited to the "usual players," a broader list of RFP recipients should be developed. This list should include relevant trade associations and their members, and municipal government organizations. In addition, all project managers should submit a list of RFP recipients to further enhance the pool of proposals.
  - *Determine Acceptable Projects before Allocating Funds.* In the initial TPI project funding process, each of the UDCs ranked projects on the basis of their merit and then allocated money until funds were exhausted. Such a practice leaves open the possibility that substandard projects may be funded. In order to avoid this potential problem, only those projects with acceptable potential for success should be considered for funding. If the total budget for acceptable projects is less than the total available budget the remaining funds could be rolled into the following year's budget, or redistributed to other programs.
  - *Scrutinize Proposals with Multiple Subcontractors.* When selecting projects for approval, those that require numerous subcontractors to deliver the product or service project should be reviewed carefully. Analysis of the individual projects

revealed that those with fewer subcontractors creating the product or service had a greater potential for successful project implementation. Projects that used subcontractors to perform *specific* project tasks, such as evaluating the market effects, did not face any difficulties relating to the use of subcontractors.

- *Develop a Formal Mechanism for Integrating Successful TPI Projects into Mainstream Programs.* Program planners should develop a formalized mechanism for allowing adequate time to assess the potential for project success, and for integrating successful projects into longer-term programs.
  - A number of the initial TPI projects took months to get started, leaving little time to demonstrate their potential for success. A possible solution is to allow for flexibility in contract length, with the proposer recommending the timeframe needed, and the proposer and the administrator negotiating an appropriate contract length. Alternatively, moving from project "year" to two or three years will solve the problem.
  - Although an informal mechanism has been developed for incorporating successful projects into UDC programs, a more formal procedure would be beneficial.

- *Separate Implementation from Evaluation.* The current program model makes implementers responsible for performing market effects evaluations of their projects. Implementers expressed confusion and frustration with being responsible for both aspects of the project. Separating evaluation and implementation responsibilities will reduce the conflict of interest and stated frustration for implementers. If responsibilities are separated, open channels of communication between implementers and evaluators will be necessary to provide timely feedback.

1.2 ANALYSIS OF THE TPI PROJECTS

On the basis of this analysis of the overall TPI program and 13 of the initial TPI projects, the TPI program has been relatively successful, particularly in view of the compressed timeline and initially uncertain program management responsibilities. In spite of these difficulties the UDCs were able to issue RFPs and select projects that for the most part were innovative, or at least different from previous and current programs. Whether it is the choice of delivery mechanism or a specific focus, all of the 13 projects analyzed were able to find a niche that had not been, or was currently not, occupied. As noted throughout this report, however, areas for improvement do exist.

Highlights of the results of this initial assessment of the 13 TPI programs listed in Exhibit 1-1 are presented below. Not all projects were selected for assessment. The Exhibit 1-1 also provides a description of the remaining eight projects that were not selected for detailed review. Note that nine of the programs target residential markets, while the remainder target commercial markets. Each of the 13 programs was analyzed using the method described earlier in this Executive Summary. This method, labeled the "Gap/Overlap Analysis Method," is described in more detail in Chapter 4. This section provides a brief summary of the key potential accomplishments of each program, along with an assessment of the potential contribution of the programs' features to the development of self-sustaining energy

efficient markets. Detailed project assessments are presented in Chapters 5-17, in the same order as presented below.

Exhibit 1-1
TPI Project Descriptions

QCID	Program	Description	Utility Sponsors				Funding ($1000)
			SCE	SoCalGas	PG&E	SDG&E	
1	ComfortWise	Introduces production builders to the benefits of the Energy Star program. Increases in the EE of the home increase the value, the use of EE mortgages reduces the overall costs of the home.	●	●		●	635
2	Integrate EE Awareness into HUD Home Buying	Provides training for lenders and realtors for EE mortgages			●		500
3	High Performance Windows	High efficiency windows information program for manufacturers through consumers	●		●	●	1295
4	Home Cooling Program	Improve mfr/distr/inst'n'l infrastructure for evaporative coolers			●		500
5	Res CAC Service - Equipment Tune-up	Info/training on A/C tune-ups using software			●		450
6	Duct Efficiency Program	Provides information/training to contractors about duct leakage inspections and duct repairs.	●	●	●	●	615
7	Home Warranty	Sells Peace of Mind Home Warranty system. Adds in CHEERS audit, thermostat, water heater wrap	●	●			990
8	Energy Star Fluorescent Torchiere	Internet marketing of torchieres			●		290
9	Mobile instructional unit	Mobile classroom equipped with energy efficient household products and computerized educational tools designed to promote consumer interest in EE	●				325
10	Energy Simulation Software	Provides consulting services necessary to develop supplementary software for energy simulation models used in the analysis of nonresidential bldgs.	●				495
11	Local Energy Assistance Program (LEAP)	Assist local government planning departments to effect current specific plans, tentative development maps, and local policies and ordinances with respect to energy efficiency.	●	●	●		1205
12	Energy Management Systems	Helps educate building managers and engineers proper use of their EMS			●		475
13	Energy Efficiency Enforcement Training	Provides affordable, quality, educational programs for building department personnel in the state, particularly those in underserved geographical areas.		●			100
14	Leading Edge Student Design Competition	Promotes and rewards (scholarships) the development of energy efficient strategies in the design process.		●			80
15	Helping Homeowners Make Building Energy Efficiency Decisions	Software tool modeling the energy economic impacts of building design and operations decisions.		●			108
16	Horizontal-Axis Coin-Operated Clothes Washers	Provides monetary incentives to customers for the purchase of horizontal-axis clothes washers				●	200
17	Apartment-Sized Refrigerator Sales	Promotes the installation of Energy Star Refrigerators				●	382
18	Expanding Market for Skylighting in Calif.	Study of correlation between skylighting and productivity			●		228
19	Develop Documentation for Energy Efficiency Impact on Comm'l Property Valuation	Develop model building specifications for use in the valuation of commercial buildings.			●		143
20	Improving C/I New Construction Through Standards and Guidelines	To publish design guidelines at low cost to promote more energy efficient buildings to building owners, designers, and managers.		●			188
21	Community Energy Assistance - Technical Resources and Planning Assistance	Assist communities with developing and implementing community energy efficiency plans and participating in Rebuild America.			●		141

Before continuing, it is important to note that one of the major themes that emerged from the analysis of each project is that a more detailed assessment of each market targeted by California's market transformation programs should be conducted. The work contained

within this report lays a solid framework from which to build needed primary data collection and analysis efforts. By completing detailed characterizations, the EE industry can be unified in its efforts to reduce barriers to market transformation in the quickest and most efficient manner.

Duct Efficiency Program

Through this program, contractors have been provided opportunities to expand their duct inspection and repair business. Marketing information supplied to the contractor for the customer's use, coupled with technical and sales training, give the ambitious contractor a head start in providing an energy-saving and profit-generating service.

Although the market effects of this program may be small at first, there is potential for a sustained increase in duct efficiency services provided by the contractors trained through this program.

High Performance Windows

The innovative approach to the promotion of high performance windows in the residential market involved delivering sales training to window distributors and retailers. The program targeted upstream and midstream market actors with educational materials and technical training, to increase the knowledge base of high performance windows.

The program successfully achieved its goal of training midstream and upstream actors. During the program implementation phase one large retailer changed some of their stocking and floor space practices. Whether this action was a direct result of the program could not be determined at this time.

ComfortWise

The ComfortWise™ Program is a small residential new construction (RNC) program that provides builders with marketing materials, home energy ratings, and third-party inspections. In addition, the program offers HVAC and shell tests to ensure that EE standards are being met; promotion of improved HVAC layout is also part of the program. ComfortWise™ appears to be focusing on a few builders while providing a greater depth service.

Given that ComfortWise™ currently operates in California without UDC funding, there is some evidence of this program's potential for sustainability. Historically RNC programs have not accomplished sustainable market transformation. If the ComfortWise™ approach proves to initiate market transformation, the lessons learned from this program should be incorporated to the overall RNC effort in California.

Energy-Aware Housing Agent Program

The Energy-Aware Housing Agent Program works on a small part of a niche market, HUD home sales (sales of foreclosed properties owned by HUD), by providing EEM training and marketing support in conjunction with HUD's Home Sales Program. The narrow focus of EEMs on a particular home market (HUD foreclosures) is unprecedented.

Although this program may increase awareness of energy efficiency in the HUD market niche, it appears that success may remain in these more narrowly focused housing markets, rather than spreading to the more general mortgage market.

Home Cooling Program

The Home Cooling Program attempts to improve the manufacturer / distribution / installation infrastructure for residential evaporative coolers. In addition, the Home Cooling Program offers training, demonstration sites, and financial incentives to builders.

Although this program addresses some of the developmental needs of evaporative cooling, additional product development efforts are required before the potential for market acceptance can be assessed.

Residential CAC Service – Equipment Tune-Up

In an effort to encourage regular non-emergency central air-conditioner (CAC) maintenance, the program provided residents with an in-home software tool to evaluate their CAC equipment. With information about the status of their specific units, residents can then make a decision on the correct action. In addition, contractors received a copy of the software to provide improved diagnostics for their service work.

The success of this program may have been significantly greater if the sponsors had been able to start marketing the program during the spring instead of the cooling season, when the majority of their business is emergency repairs. Furthermore, because the consumer is unable to complete the tune-up assessment without technical assistance, the tune-up software merely acts as a check for whether or not the technician is providing accurate information.

The Service Institute Home Warranty Program

In an attempt to encourage whole-house retrofit, this program bundled a one-year warranty for service on all systems in the house with a California Home Energy Efficiency Rating System (CHEERS) audit. In addition to the possibility that the homeowner could qualify for an energy efficient mortgage based on the CHEERS rating, both the CHEERS audit and the warranty offer additional contacts with homeowners, contacts which provide opportunities to promote and sell energy efficient measures. The overall goal of the program was to provide continued access to the home during the warranty renewal, at which point contractors could follow up on audit recommendations. The program also served as a general contractor for implementation of audit recommendations.

The logistical difficulties of coordinating the services of the CHEERS raters, contractors, financial entities and other players was insurmountable during the 1998 program year. While the concept of the program is innovative and has the potential to contribute to the development of the whole-house retrofit market, the success of this program would require as yet unseen cooperation and coordination between participating parties.

ENERGY STAR® Fluorescent Torchieres

This program uses E-commerce, through the Internet, to reach potential consumers with limited access to EE products (e.g., college students, rural customers). Under this program, a web site was developed, which provides information on ENERGY STAR® Torchiere lamps, and the opportunity to purchase them at a discounted price, subsidized by the funding provided by the TPI contract.

The web site was built on time and continues to function. However, whether the torchiere manufacturers view this sales tactic as a viable addition to their overall sales strategy depends upon the final results of this year's efforts,

Mobile Instructional Unit (ENERGY STAR®)

The College of Energy Efficiency Knowledge (CEEK) seeks to educate consumers about the benefits of energy efficient products through promotion of the ENERGY STAR® label via the Mobile Education Unit, a motor home outfitted with ENERGY STAR® products and information. This mobile unit made appearances in Southern California Edison's service territory over a period of four weeks.

Due to the limited active length of the program, and the small number of visitors to the Mobile Education Unit, it is not possible as yet to assess the potential effectiveness of the program.

Energy Simulation Software

This software module works with the CAD programs generally used by architects. It is an add-on to enhance the capabilities and performance of the tools already in use. In the absence of significant promotional efforts, it is likely that only those professionals who already seek a method to improve energy efficiency in their design will use this tool.

The software was created by the project team, and is therefore an implementation success. The potential for sustainable market effects is not immediately apparent as it is too early to determine whether the software will be embraced by the industry.

Local Energy Assistance Program (LEAP)

LEAP is designed to stimulate the consideration and use of energy efficiency practices in local planning, zoning, and siting processes. Introducing energy efficiency considerations in the early phases of new construction projects may allow for the realization of energy efficiency opportunities that would otherwise be ignored.

The long-term success of this program will depend in part upon the market's acceptance of the resulting community environment and the ability of builders to make money with such projects. However, the potential effectiveness of this program is relatively higher than that of its predecessors, because it includes builders and developers in its approach.

Energy Management System

The Energy Management System (EMS) Program is a relatively modest effort to close the gap between current practice and the state of the art in EMS engineering and operation. It is the only program of its kind to address the barriers of EMS vendors with any degree of effectiveness.

The project was able to successfully retro-commission EMS systems. The project's narrow market (large office buildings) and geographic focus (San Francisco Bay Area) both limit the program's sustainability.

Building Official Code Training

Designed to educate rural inspectors on building codes in an effort to increase compliance, the Building Official Code Training program spread education of code changes to areas that traditionally have been left behind. In addition, the program attempted to measure changes in awareness resulting from the program.

This program was small, lacked market barrier identification and targets, and had no energy savings or market effects study. Its attempt to measure the code knowledge gained by trainees was rather unsuccessful. Furthermore, the energy impacts resulting from code compliance cannot be estimated with much certainty. There is neither evidence of program impacts nor any indication of sustainable market effects.

1.3 SUMMARY

As illustrated above, the TPI program was, with some exceptions, able to select and implement a series of innovative projects. Some projects were good complements to current program offerings, while others charted new directions. The program and project managers worked successfully to overcome obstacles created by compressed time schedules and unclear program administrative responsibilities. Implementation of the recommendations for program refinement and enhancement contained in this report will, we feel, enhance the success of future TPI efforts, thereby contributing to the cost-effective acceleration of energy efficiency industry development in California.

2. INTRODUCTION

The TPI program represents an innovative way to increase the pool of program design and implementation skills while diversifying the EE program offerings. By opening EE project funding to the private sector, the program may be able to quicken the pace of market transformation.

2.1 EVALUATION GOALS AND OBJECTIVES

The goal of the 1998 TPI evaluation project was to assess the viability of TPI programs to effectively transform the market for energy efficient products and services. The project will assist the UDCs, the CBEE and the CPUC in determining whether TPI programs should be continued, modified, or terminated.

The goal was met in a two-part evaluation—of the TPI approach in general and the individual "innovative" projects in particular. This encompassed both a process evaluation of the approach and an assessment of the effectiveness of the individual projects in contributing to the CPUC's efforts to transform California's market for energy efficient products and services.

- TPI Program Process Evaluation: The process evaluation assessed all major aspects of program design and implementation, to ascertain relationships between program processes and successful projects, thereby providing the information needed to refine future TPI program offerings. Specific areas being investigated are:
  - the RFP process, especially its success in encouraging *effective* innovation;
  - the process for soliciting respondents to the RFP;
  - the TPI selection process;
  - the contract process; and
  - the project implementation process.

- TPI Project Assessments: The project assessments are designed to assess the effectiveness and innovativeness of 13 of the 18 unique TPI projects in the context of past, existing and planned efforts to stimulate self-sustaining energy efficiency markets in California, and, where relevant, across the US. For each energy efficiency product and service market targeted:
  - the energy savings potential was assessed, to provide an indication of the importance—from an energy savings perspective—of the targeted end uses/energy efficient products and services;
  - the market barriers for all market participants, and related high-potential intervention strategies, were identified; and
  - the gaps in needed intervention strategies filled by the TPI programs, synergies with other programs, and overlaps with other programs were analyzed, providing

a logical, internally consistent context for the assessment of the potential effectiveness and innovativeness of each TPI program.

3. PROCESS EVALUATION

The TPI program should be judged as a successful attempt to expand the EE market place. While generally successful, there are areas for improving the effectiveness and efficiency of the program

3.1 EVALUATION APPROACH

3.1.1 Method

The integrated program process evaluation and project assessment approach was designed to provide the best possible indication of TPI program potential, given available resources. Through interviews with all participants and review of program materials, the evaluation team was able to piece together a series of recommendations for program improvement. The tools used to reach our conclusions are presented below.

- Interviews with UDC program administrators, project managers and project sponsors, plus focus groups with project sponsors, provide much of the data for the program process evaluation, as well as input to the project assessment.

- The review and analysis of secondary data sources—of both California initiatives and related national and regional initiatives—is the major source of data for the project assessment, but it also sheds light on the process evaluation.

- Customer surveys were conducted to provide input primarily to the process evaluation, as well as providing information on project effectiveness.

With this overview, a brief description of the RFP development and proposal solicitation and approval phases of the TPI program is presented in the next section to set the stage for the interim findings and recommendations presented later in this chapter.

3.1.2 RFP Development, Proposal Solicitation and Selection Process

The TPI program RFP development, proposal solicitation and selection process was extremely compressed, especially for a new program desiring innovative projects to assist in effectively transforming California's energy efficiency markets. The UDCs were notified on October 1, 1997, to begin the formal RFP preparation and proposal solicitation process. SDG&E issued the first RFP on November 7 one month after the process began. The other three participating UDCs issued RFPs over the next month.

Although the proposal preparation periods—which varied between three and six weeks—were not unusually short, the innovative nature of the expected responses, as well as the fact that some proposal preparation periods coincided with the end-of-year holiday period, caused difficulties for some respondents.

Even though the UDCs, responding to the desire to get the 1998 projects in the field in early 1998, implemented an efficient proposal review and selection process (only seven business days in the case of SCE), a two-stage selection process was required for some of the projects selected. In the two-stage process, the UDC identified proposals with potentially successful ideas, although the appropriate market effects and cost-effectiveness study materials were either missing or were superficial in nature. In these cases bidders were required—under challenging time constraints—to re-submit their proposals with new and/or improved market effect and cost-effectiveness sections.

After CBEE approval of the projects and the subsequent bidder notification, the contract negotiation process began. During the contracting process, many sponsors had to work closely with the UDCs to develop deliverable-focused statements of work.

In summary, the development and fielding of the initial 1998 TPI program was a necessarily accelerated undertaking, with UDC program administrators, project managers and project sponsors working to implement projects in early 1998. Preliminary findings and recommendations regarding the RFP, solicitation, selection, contract, and implementation processes are presented in the next sections.

3.2 RFP PROCESS

Due at least in part to the short time frame allocated to RFP preparation, the RFP development process was necessarily compressed. Although this resulted in RFPs that were consistent across three of the four UDCs—a feature that was found to be helpful by the selected bidders that participated in the two focus groups—it also resulted in a process with considerable potential for enhancement. [1] On the basis of our project team's review of the RFPs themselves, review of selected and unselected proposals, interviews with program and project managers and the results of two focus groups with selected sponsors, the following recommendations should be considered in future TPI RFP development processes.

- More time and effort should be allocated to up-front preparation. As is the case in any RFP process, and especially in the case of an effort such as the Third Party Initiative Program in which innovative (yet effective) proposals are desired, often by parties that are not well-versed in the market transformation literature and the evolving California market transformation environment, the quality of proposals received is directly proportional to the quality of the background information provided to potential respondents.

- Pre-proposal notification and proposal submission periods should be increased. Advance notice of RFP release dates (and, in future years, a dependable schedule for proposal releases and project duration), as well as a longer submission period, would enhance the quality of the TPI projects. Also, as a friendly aside, consultants and

[1] It is interesting to note that the one RFP that was different among the four actually contained more information on the definitions of market effects, market barriers, etc. The possible effects of these differences on proposal quality and project effectiveness did not appear to be significant.

other human beings do not always produce their best work when proposals are due on December 29 and January 2.

- **Clearer definitions of project requirements should be provided.** Specifically, the RFP process should attract projects that are:
  - Innovative and effective, and that extend and build upon existing programs;
  - Demonstrate an understanding of market transformation and market effects;
  - Have strong project implementation plans, and deliverable-focused statements of work; and
  - Are explicitly market transformation, and not resource acquisition, programs.

A key issue in developing and implementing effective TPI Program RFP and solicitation processes is devising a method to attract proposals that are "outside of the box," but demonstrate a clear grasp of existing market transformation-related market assessment and evaluation activities. More detailed information relating to each recommendation for enhancing the RFP process is presented in the remainder of this chapter. Key findings from the research conducted to date are presented first, followed by preliminary recommendations.

3.2.1 Pre-RFP Preparation

3.2.1.1 Research Findings

Bidders found certain aspects of the RFP confusing, in particular the market effects study and cost-effectiveness study requests. UDC program and project managers reported that many of the proposals did not even contain market effects or cost effectiveness sections, although these sections were explicitly requested in the RFP. In some cases the UDCs required a second round of proposals so that bidders could add/enhance their market effects and cost-effectiveness sections. Generally the UDCs believed it more important to field innovative programs, and that the market effects, cost effectiveness and other sections could be improved with some UDC intervention.

The level of market transformation awareness and understanding varied across the bidders. Some bidders were integrated into the market transformation process, while others were clearly neophytes. For at least one selected project the market effects study will not be completed due to confusion on the topic, even after assistance from the sponsoring UDC. UDC program managers also noted that there were frequent misinterpretations of Eto *et al.*[2] Most bidders felt the market effects study request lacked perspective, given the limited time frame for the projects.

The objective of producing innovative projects was not supported by the provision of existing and planned program descriptions, and/or market assessment and evaluation (MA&E) reports, in the RFP. The RFPs did not include descriptions of existing or planned programs or

[2] Eto, J., R, Prahl, and J. Schlegel, *A Scoping Study on Energy Efficiency Market Transformation by California Utility DSM Programs* (CA: Lawrence Berkeley National Laboratory, 1996).

areas of energy efficiency program focus. While the proposal stated that additional information was available by request, UDC project managers did not recall a single request for advice filings, program descriptions, and/or MA&E reports.

3.2.1.2 Recommendations

One of the TPI program goals was to select programs that are innovative and effective in transforming the market for energy efficiency services. This goal was somewhat hampered by the less than universal definition of innovation. In some cases, program managers and project managers differed on which projects were innovative and which were not.[3] The only unified definition of innovation appears to be "projects the utility has not implemented before." In order to select truly innovative projects, detailed assessment of markets should ideally precede the next RFP issuance.

The availability of clear, concise summaries of market assessments for each of the markets targeted by TPI programs would greatly enhance the likelihood that innovative and effective TPI projects are funded. Ideally, information should be provided that answers the following question:

Within the framework of building a self-sustaining market/industry, what (if any) interventions will be effective in accelerating the development of the market/industry? Furthermore:

- What is currently being done?
- What level of effort is needed?

That is, available market assessment and evaluation research should be summarized to provide respondents with available information on the current status of the market/industry, along with a discussion of the mechanisms by which the industry might/will become self-sustaining. Elements should include descriptions of:

- key market participants, their relationships, the current extent of and attitudes towards the targeted energy efficiency products and service (that is, the market baseline), and the barriers to sustainable industry development faced by each participant (an indication of the importance of each barrier is also important);
- intervention strategies tied directly to all relevant market participant/barrier combinations, along with an indication of the possible effectiveness of each strategy; and
- past, existing and planned public and private sector initiatives designed to implement the intervention strategies, again with direct link between the market

[3] Program managers are defined as those individuals who ran the TPI program for their UDC. Project managers are defined as those staff members who managed the individual projects. In some cases the same individual fills both positions.

participants / market barriers / interventions / initiatives (likely effectiveness of the initiatives should be included).

The TPI evaluation project team took this approach in assessing the effectiveness / innovativeness of 13 of the 1998 TPI programs in the Project Evaluation portion of this project. In undertaking this effort, we realized that providing the information and linkages described above is difficult, and not at all an exact science. Regardless, we felt this type of integrated information would greatly enhance the success of not only TPI programs but all future market transformation programs.

3.2.2 Pre-proposal Notification and Proposal Submission Periods

3.2.2.1 Research Findings

The *very* compressed schedule for RFP notification and proposal submission was the most cited reason for problems associated with the RFP process.[4]

- The time between the release of the RFPs and their due dates posed problems. Moreover, the problems and their severity varied across proposers.
  - In general, more time is needed to develop new ideas than to propose more standard approaches. Some of the sponsors saw this RFP process as an opportunity to propose ideas they had been considering for some time, approaches that had received considerable thought and germination. However, some participants stated they simply repackaged standard approaches to meet the language of the RFP.
  - In itself, the 3-6 weeks allowed for writing the proposals was not a barrier. Most of the companies represented in the groups are experienced in writing proposals and consider this amount of time normal.
  - Nonetheless, several sponsors noted that it is important that they be prepared for such an effort. That is, they need to know that the RFP will be coming out at a certain time and will be due at a certain time, so that they can plan appropriately. Although several of the participants were aware of the genesis and likely timing of the TPI Program quite early in the process, others learned about the RFP belatedly—some only after it had been released. For the latter group, the timing posed a serious challenge.
  - The timing creates particular problems for certain types of entities, and may discourage participation in the TPI program. For example, municipalities and similar organizations may be disadvantaged in applying for funds because of the internal review and approval processes required before they can submit official bids.

[4] Section 1 describes the 1997 / 1998 Schedule for the TPI Program in general, and provides specifics about the timing of the RFP process. In most cases the RFP had a one month due date. However, given the broad audience some bidders did not find out about the proposal until a week before the due date.

– Timing may also preclude joint bids, with high levels of synergism and creativity, thereby eliminating potentially innovative programs. One successful sponsor noted that the consortium of four companies involved in his project could not have gotten together and worked out their roles and responsibilities or various other contractual issues in a 3-6 week period. They were successful because they had anticipated the RFP and had begun working out their approach in advance of its release.

- According to focus group participants, the pre-bid conference offered by one UDC was of limited value because no one was able or willing to respond to many of the contractual questions that arose (e.g., regarding conflicts of interest). Although this was understandable, given the novelty of the program and the uncertainty of the anticipated relationships among the CBEE, the UDCs, and the sponsors, the result was frustration and confusion, rather than clarification and progress.

3.2.2.2 Recommendations

To ensure that only *innovative* and *effective* proposals are submitted, the RFP process should be lengthened. The TPI program is a new concept in California, and as such is not in the forefront of potential bidder's minds. Therefore, more time should be allotted for the RFP process while the TPI program concept matures so that more individuals may participate, rather than primarily those individuals who are "in the loop." The extension should give newcomers time to bridge institutional or logistical constraints, which would otherwise limit their participation. More effective solicitation mechanisms will also aid in attracting innovative projects—these issues are addressed in the next chapter.

- If at all possible, care should be taken to avoid issuing RFPs at the end of the calendar year, when firms tend to have many project deadlines and the disruption of holiday periods is likely.

- Continued efforts to advise the energy efficiency community about the likely timing for new rounds of RFPs are critical in helping potential sponsors prepare to submit high quality proposals.

3.2.3 Clearer Definitions of Project Requirements

3.2.3.1 Research Findings

At least in part because the TPI RFP was a first attempt (at least in the California energy efficiency community) to solicit projects of this kind, UDC program managers felt that the TPI RFP was (necessarily) less focused and defined than more traditional RFPs (e.g., RFPs designed to evaluate the impacts of an HVAC program under the California protocols). Enhanced background material and more specific project steps would be beneficial in the future.

- According to program and project managers, many of the bidders became bogged down in the RFP sections and failed to explain their project. One RFP did not even ask for a project description, only studies for cost effectiveness and market effects.

- Even though the (selected) sponsors believed in general that the RFP was well-written and clear, they expressed severe criticism regarding the "academic" discussions of market transformation included in the RFP, the lack of a practical definition of the concept, and the (subsequently vague) requirement for a market effects plan.

- Several sponsors were uncomfortable with the requirement that they assume responsibility for assessing market effects. For some, the problem was simply that their company is set up to implement projects and does not have the background or skills to conduct monitoring and evaluation.[5] In at least one instance, the problem was overcome by subcontracting the market effects work to another firm. For others, the requirement seems to belie the ideal of having evaluators and program implementers independent of one another.

- Virtually all focus group participants who commented on the matter were skeptical of the value of market effects studies associated with market transformation projects of such short duration. Even though participants recognized that the nine-month period for the initial set of projects was dictated by the anticipation that new program administrators were expected to take over from the UDCs in mid-1998. Nonetheless, virtually all believe that such a limited program period was incompatible with the stated program intent of instituting market transformation programs.
  - Several participants focused on the difficulties of visibly moving the market or increasing sales of energy-efficient products in a short period, or focused on the attribution problem.
  - Others focused on the importance of achieving sustainability. At least one project involved educational interventions that could not possibly affect the market in any direct way until the students put new skills into practice.

Furthermore, participants in the focus groups regarded the requirements of the RFP as rewarding proposers who already understand the theory and intent of market transformation *and* who are familiar with regulatory and utility perspectives on resource costs and resource tests.

Other interesting interim findings concerned the need to develop deliverable-oriented statements of work, the submission of resource acquisition projects, and the issue of project sponsors submitting (and implementing) monitoring and evaluation plans.

- Once proposals were selected, the UDCs had to work with the selected bidders to craft a Statement of Work, which was deliverable-focused. For the individual TPI projects to be hands-off, their contracts had to be constructed in a manner that required little project intervention by the UDC project managers. To accomplish this goal, the Statement of Work for each project was deliverable-focused. In this manner,

[5] One sponsor found that the requirement forced a level of design review that was quite useful in helping the company understand the mechanisms they believed to be operating in the market at issue, thus improving their proposal.

selected bidders could submit proof of deliverable completion, which would then lead to payment.

- Resource acquisition proposals were submitted even though the RFP requested proposals that were market transformation in nature.

- Some focus group participants noted that the requirement that those implementing TPI proposals also be responsible for monitoring and analyzing their market effects should be reviewed.

There were distinctly different viewpoints on the RFP process; however some common themes did appear. The most common theme focused on the market effects study portion of the RFP, followed closely by the cost-effectiveness studies. While individuals may have been able to conceive innovative projects, with few exceptions they were not able to complement their ideas with effective market effects and cost effectiveness studies. Some bidders were able to meet both goals, demonstrating that the gap can be bridged. Most bidders, however, were not able to combine innovative projects with solid market effects studies, demonstrating the difficulty of the task.

3.2.3.2 Recommendations

3.2.3.2.1 Two-step RFP Process

Implementation of a two-step RFP process could increase the number of proposals which contain more complete project implementation plans. The first step in the process would entail submission of a relatively short initial project description that would include: 1) a brief description of the project, 2) the market participants the project will serve, 3) the market barriers the project will reduce, and 4) the intervention strategies that have been and could be used to remove some or all of the identified barriers. A page-constrained template should be developed to provide guidance in submitting the project description.

During the second stage, participants would be asked to elaborate and refine their objectives, and more importantly the implementation plans for their projects. Wirthshafter et al, describe a similar two-stage process.[6]

3.2.3.2.2 Require Deliverable-Focused Statements of Work

The RFP should require deliverable-focused statements of work. This requirement may reduce the iterative nature of the proposal and contract processes. Provision of a template, or an example, will help facilitate submission of more deliverable-focused statements of work.

3.2.3.2.3 Include a Disqualification Statement for Resource Acquisition Proposals

The RFP should clearly state that resource acquisition proposals are unacceptable. In addition, the RFP should list types of projects that the UDCs consider resource acquisition for

[6] Wirthshatfer, R., R. Bordner, L. Baxter, *Encouraging Innovation in the Third Party Initiative Program*, March 3, 1999

example, water heater rebate programs. This is not to exclude projects which save energy, but discourage repackaging projects from resource acquisition to market transformation. Resource acquisition proposals that were rejected, as part of the 1998 TPI Program, would make a good starting point.

3.2.3.2.4 Reassess Monitoring and Evaluation Efforts

As discussed above, the requirement that those implementing TPI proposals also be responsible for monitoring and analyzing their market effects should be reviewed. If this approach is ratified as consistent with the CPUC's policy objectives, the reasons should be more fully communicated to potential sponsors. Implementers would still be required to identify the market participants, and market effects associated with their study—thus ensuring focused studies.

3.3 SOLICITATION PROCESS

Analyses of the program manager and project manager interviews, bidder focus group transcripts and program materials have suggested the following recommendations for improving the solicitation process.

- **Systematic notification mechanism for potential bidders.** Through a more systematic notification scheme, potential biases can be reduced, and solicitation broadened.

- **Develop a consistent, anticipated solicitation schedule.** With more preparation time, a broader range of proposals will likely be generated, rather than the "usual bidders."

- **Develop a broad list of possible RFP recipients.** Moving to an electronic mail list notification system will require a list of potential recipients. We believe that the inputs for such a list exist and only require consolidation.

Each recommendation is discussed in detail below.

3.3.1 SYSTEMATIC RFP NOTIFICATION MECHANISM

3.3.1.1 Research Findings

The RFP notification, or solicitation, mechanism differed across the UDCs. The solicitation methods ranged from solely electronic notification means, e.g. e-mail, or Web-site posting, to more traditional methods such as printed mail. In turn, recipients then distributed the RFP to other potential bidders. In many cases, bidders received the RFP from secondary sources, or further. The effect on bidders who received late notification was tremendous. This fact presented further complications for some bidders as the due dates fell during the holiday season.

As shown above, the UDCs used numerous methods to reach potential bidders. One UDC attempted to reach this audience by sending out almost 70 RFPs via e-mail to groups associated with CBEE, posting it on the Internet, and distributing hard copies. They received 34 proposals. The quality of the resulting proposals varied considerably, due, in part, to this "shotgun" approach to the solicitation process. In contrast, another UDC, directing its solicitation through its Special Public Purpose Service mailing list of approximately 40 eligible potential sponsors, received only 9 proposals. Of those received, only two firms appeared on the mailing list, the rest received notification from sources other than the mailing list.

Sponsors learned about the RFP in a number of ways.[7] Several were highly involved in the ongoing discussions of deregulation and regularly attended meetings of the CBEE. Indeed, some indicate that they were among the initiators of the effort to create the TPI program. Most of the participants in the focus groups appear to have learned about the program through word-of-mouth communications. Several sponsors learned about it from program managers at UDCs with whom they were already working or with whom they had regular contacts. Others learned about it from consultants, and some from colleagues at other companies who are "plugged in" to the state's energy efficiency network.

Overall, it did not appear that a systematic effort was made to inform potential sponsors about the TPI program or to ensure that the solicitation was made available to potential new entrants. Participants offered several suggestions when asked how they might best be informed about subsequent RFPs. Several indicated that web-based notices would be most convenient and most timely. A few sponsors demurred, however, noting that their companies did not have the personnel resources to actively track web-sites; they suggested, instead, or in addition, that notices and related information could be provided through an electronic mailing mechanism to companies that had expressed an interest in the energy efficiency programs. In addition, a few focus group members prefer receiving such information through printed mail. None was in favor of printed notices through news media.

3.3.1.2 Recommendations

The solicitation process can be improved by providing a systematic notification mechanism for potential bidders. A more systematic approach will reduce potential inequities and help ensure that the pool of proposals includes firms other than "the usual suspects."[8]

In an effort to create a systematic solicitation mechanism, we advocate an electronic mailing approach as the primary notification tool. Potential bidders could indicate their interest by subscribing to the list. Notification of the RFPs availability would occur through e-mail. An alternative is to notify parties by first class mail. How to populate the list is addressed separately below. It is recognized that the use of such lists may increase the burden on reviewers, if the result of widespread publicity is to increase the pool of proposals. Appropriate actions should be taken to reduce the burden of the reviewers.

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[7] These findings are necessarily drawn from the comments of successful bidders.

[8] Wirthshafter *et al* suggest that in cases where the awarding body may be unknown, substantial resources may need to be spent in order to ensure broad solicitation. In cases where the awarding body *is* well known, this is less critical.

3.3.2 DEVELOP A CONSISTENT RFP SOLICITATION SCHEDULE

3.3.2.1 Research Findings

Without clear anticipation of the TPI RFP, participation in the program may be limited only to those who have sold energy efficiency services in the past. Interviews with program managers revealed that all bidders had done work for one of the UDCs at one time or another. Although several of the participants were aware of the genesis and likely timing of the TPI Program quite early in the process, others learned about the RFP belatedly — some only after it had been released. For the latter group, the timing posed a serious challenge. It is clear that advance notification presents a potential advantage, which could be removed with a consistent RFP solicitation schedule. Several sponsors noted that it is important that they be *prepared* for such an effort. That is, they need to know that the RFP will be coming out at a certain time and will be due at a certain time, so that they can allocate staff appropriately and gather resources.[9]

Timing and preparation for the RFP pose particular problems for certain types of entities. For example, municipalities, local government and similar organizations may be disadvantaged in applying for funds because of the internal review and approval processes required before they can submit official bids. Given these constraints, groups like local government may be effectively shut out of participating in TPI.

Timing may also preclude many joint bids, with high levels of synergism and creativity. One successful sponsor noted that the consortium of four companies involved in his project could not have gotten together and worked out their roles and responsibilities or various other contractual issues in a 3-6 week period. They were successful because they had anticipated the RFP and had begun working out their approach in advance of its release. Note that with a fixed RFP schedule, it would be possible to response to an RFP in 3-6 weeks, if it were anticipated.

3.3.2.2 Recommendations

By developing a consistent solicitation schedule (for example, issuance on February 1 of each year), the bidders will be able to anticipate the RFP's arrival and prepare in advance for their response. For some potential bidders there may be institutional hurdles, such as internal review, which require more planning in order to respond to an RFP. In addition, firms with multiple subcontractors may require more time to coordinate proposal and project activities. Implementation of a solid RFP schedule, similar to NEA or NIH grants, will reduce the bias towards those with institutional constraints, such as local government agencies, cities, or municipalities, consortiums requiring time to work out roles and responsibilities, and those not currently active in the state's energy efficiency network.

[9] Wirthshafter *et al*, in their research on innovation reiterated the importance of a regularly scheduled RFP process.

3.3.3 DEVELOP A BROAD LIST OF POSSIBLE RFP RECIPIENTS

3.3.3.1 Research Findings

The RFP was not received by all parties at the same time, as described above. In some cases bidders were notified by word of mouth, from second- or third-hand sources. While most UDC procurement departments and project managers have contractor lists at their disposal, they were not used with any consistency. One sponsor, who was currently working for a UDC, found out about the TPI proposal from another project manager at the UDC, not the one managing their contract.

Advocates of the electronic mailing services and first-class mail notification schemes were confident that comprehensive lists of potential bidders are available through the UDCs, CEC and the CPUC, based on past projects.

3.3.3.2 Recommendations

During the focus group session, many participants stated that an electronic mailing service approach would work best. In order for this approach to function, it will need to be populated with names of interested parties. Procurement lists, utility project manager contacts, trade organizations, and other sources can be used to construct as broad list of possible. In addition, the CEC and CPUC should be contacted for possible input into the list. Other sources could be trade groups, research institutes and municipal and government organizations.

3.4 SELECTION PROCESS

The approach to selecting between projects was fairly consistent across the UDCs. In general the UDCs selected projects that did not compete directly with existing programs. Most of the projects selected were complementary to current program offerings or were similar to previous efforts, differing primarily in the delivery mechanism. Projects that might be considered "out there" were generally not selected due to the difficulty selection committees had conceptualizing the project. However it should be noted that some projects that deviated significantly from previous offerings were selected.

The UDCs took advantage of their breadth of experience when building their selection committees. Across the board, each UDC took the project selection task very seriously and should be commended for their fairness and timeliness. In most cases, the selection teams were made up of evaluators, program planners and implementors, and staff from contracts and procurement departments, providing the required expertise to accurately review each proposal. Generally the selection process can be viewed as successful, particularly in light of the compressed timeline. A few areas of improvement remain.

- **Any sense that utilities should spend the entire allotment of TPI money should be removed.** An earnest attempt should be made to allocate TPI resources. However if enough quality projects can not be found to exhaust project resources, then the money should be reallocated or rolled over.

- **Avoid projects with too many contributors or actors in the project team.** Projects with multiple subcontractors, and those where subcontractors play a significant role in the project's success should be avoided.

- **Provide feedback for non-selected sponsors.** Non-selected sponsors expressed frustration in not getting timely or constructive feedback for their losing proposals.

- **Selection criteria for non-hardware projects should be reviewed.** To the degree that non-hardware programs are deemed valuable and that they appear to be qualitatively successful, some redefinition or relaxation of standards of measurability and cost-effectiveness may be useful.

Each recommendation is described in detail below.

3.4.1 Allow Incomplete Allocation of TPI Funds

3.4.1.1 Research Findings

The TPI funds available to each UDC differed significantly with SDG&E receiving $1.01 million on the low end, and PG&E receiving $4.0 million on the upper end. The UDCs were directed to allocate at least 50 percent of the funds to residential programs. In two cases the UDCs felt that the pool of proposals was strong enough that they could justifiably spend more resources. In another case, an UDC felt that the quality of their proposal pool was such that they would have stopped earlier in the process. However, they felt compelled to exhaust the allocated resources.

The approach to selecting projects did not differ significantly across UDCs. Any differences were isolated to the weighting of proposal features such as the market chosen, the delivery mechanism and the market effects study. The differences that existed were minor enough not to cause major variation in the projects selected across the programs. In one case a UDC did not explicitly state the weighting of the proposal features in the RFP.

Once the selection committees were assembled, each member was asked to review the submitted proposals and score each section of each proposal separately. Committee members later reconvened to determine an overall score. After consensus was gained on the overall score of each project they were then ranked from best to last. Program dollars were then distributed until exhausted. In one case, the UDC program manager worked to reallocate budgets of winning proposals in order to fund an additional project.

3.4.1.2 Recommendations

CPUC funding rules should permit some flexibility to either over-commit or under-commit the planned program budget level. The current practice of ranking proposals and then allocating money until budgets are exhausted leaves open the possibility that some substandard projects will be selected. Alternatively, project selection should be based solely on the project merits and independent of costs or remaining funds. The cut off point for projects should be established before dollars are allocated. If the funding level exceeds the

sum total for the selected projects then the remaining funds should be rolled over or distributed to some other more useful project.

3.4.2 Carefully Screen Proposals with Multiple Subcontractors

3.4.2.1 Research Findings

The use of subcontractors was prevalent in the TPI program. In some cases specific project features were subcontracted, such as conducting the market effects study. In other cases, subcontractors worked closely to produce the project's product or service. While subcontracting in and of itself did not signal success or failure, it did play a significant role in the failure of the least successful projects. Some of the least successful projects were those that either required the coordination of numerous subcontractors, or relied on subcontractors for supplying a significant component to the project (e.g. a supply of appliances). Coordinating numerous subcontractors is difficult for seasoned implementation firms working in close contact with UDC project managers. For those with limited implementation experience, working independent of the UDC, the task can be overwhelming. This is not to say that there is no place for projects with multiple subcontractors, only that the TPI program may not be the optimal place to implement these projects.

Projects where the prime relies upon a subcontractor to deliver the core product for the project should be scrutinized in detail. For example, one project relied upon a major manufacturer to deliver appliances for stocking in retail outlets. Six months after initiating the project the manufacturer had not delivered the promised appliances. The project therefore did not get off the ground in the manner described in the proposal. Again this is not to say that there is no place for such projects with in the framework of TPI, only that the proposals should be scrutinized, and where possible, contingency plans should be developed.

The use of subcontractors seemed to be less of problem when their role was limited to evaluation, rather then a production of the product or service. In these cases the use subcontractors was not a hindrance to the project's success.

3.4.2.2 Recommendations

Proposals which require subcontractors to produce the product or service should be analyzed in detail. Given the "hands-off" nature of the TPI program, proposals which require significant input by subcontractors should be reviewed carefully. For these projects, contingency plan should be established, where possible, to ensure the project's timely completion. In the case of the appliance program, additional suppliers should be established before hand. The general rule should be to establish contingency plan in cases where bottlenecks may occur.

3.4.3 Provide Feedback for Unsuccessful Proposals

3.4.3.1 Research Findings

The failure of most UDCs to notify unsuccessful bidders created some ill will among those affected. Several sponsors complained of the lack of feedback regarding the strengths and weaknesses of the unsuccessful proposals. Lacking such feedback, they were unable to

determine how they might improve their offerings. Given that each UDC used a numeric rating system to score each aspect of the bidders proposal, it does not appear to require much more effort to transfer this information to unsuccessful bidders.

The unsuccessful proposals fell into two primary categories: those that overlapped with current UDC program offerings, and those that were focused on resource acquisition rather then market transformation. Providing complete market assessments, as described earlier, may reduce the number of proposals that overlap with current UDC programs. Eliminating the submission of non-market transformation proposals is likely a function of time.

3.4.3.2 Recommendation

Given that all proposals are scored and ranked, it should not be too difficult for the UDCs to provide basic feedback to unsuccessful bidders. Generic explanations that described how each section was scored could be combined with scores to provide direction for unsuccessful bidders. Transferring this information to bidders will only increase the quality of future submissions, at minimal effort to the UDCs.

3.4.4 Review Selection Criteria for Non-Hardware Projects

3.4.4.1 Research Findings

The TPI program delivered a broad range of projects, from training projects for rural building inspectors to horizontal-axis clothes washers for laundromats. It is the educational type, or non-hardware programs, that face inherent difficulties in measuring both cost-effectiveness (CE) and market effects (ME). Sponsors stated they had difficulty in addressing these issues. Review of project final reports confirmed this in some cases.[10]

The request that ME studies be conducted after a nine-month task seems to be difficult at best, and impossible in some cases. Some projects could not realistically be expected to generate market effects or to assess such effects, either because of the nature of the projects or the time available for the effort. Probably the best example may be the EE design competition program which awarded scholarships to students for outstanding EE design. Recipients of these awards are unlikely to practice design until the time they graduate, making it difficult to find market effects after nine months. At least one UDC appears to have recognized these constraints and to have negotiated the pertinent contracts appropriately.

3.4.4.2 Recommendations

The administrators and the CBEE may wish to review the selection criteria for TPI projects, both in terms of inclusion and priority. To the degree that non-hardware programs are deemed valuable and that they appear to have been at least qualitatively successful, some redefinition or relaxation of standards of measurability and cost-effectiveness may be useful. If accepted, this should be communicated appropriately to potential bidders.

[10] See earlier discussion on separating evaluation and implementation responsibilities.

3.5 CONTRACT PROCESS

The nature of the TPI program forced a departure from previous project contracts. Specifically the hands-off nature of the TPI projects required deliverable-focused statements of work. Contracts had to be structured such that project managers could easily determine what tasks had been completed. Generally speaking these tasks were tied to completing training sessions, signing up contractors, or other specific tasks. In general this structure did not pose a problem for the UDCs or the bidders, although some did request broader definitions for deliverables.

The length of time for completing contract negotiations varied from a few weeks to nearly five months. In some cases these delays stemmed from concerns about transferring projects from the UDC administrators to a new central administrator. Related to this topic were concerns about intellectual property rights, and their transference. In most cases the UDCs requested the rights to software and other intellectual property, including those developed outside of the program. Several focus group members voiced their frustration with the UDCs efforts to take unto themselves or a public entity the ideas of the sponsors. They pointed out that one of the motivators for sponsors in the project—and a potential driver of sustainability—is the opportunity for entrepreneurial companies to reap future profit from their effort. While the contracting process can generally be described as successful, there are a few areas for improvement.

- **Issues related to intellectual property should be clarified earlier.** To the extent possible, policies relating to intellectual property should be laid out in the RFP.

- **Reduce the length of the contracting phase.** Given that some projects may be seasonal, the UDCs should seek to reduce the length of the contract negotiation phase.

3.5.1 Clarification of Intellectual Property Issues

3.5.1.1 Research Findings

The retention of intellectual property rights is key to any self-sustaining industry. As pointed out earlier, one of the key motivating factors for sponsors was the opportunity for entrepreneurial companies to benefit in the future from their efforts. One potential role for the TPI program is to serve as an incubator for energy efficiency business ideas. If used in this manner the retention of property rights will be even more important for bidders. Several sponsors expressed a real concern for the need to protect those with successful projects from being underbid in future competitions.

3.5.1.2 Recommendations

Consistent with the goal of creating a self-sustaining EE industry is the retention of intellectual property rights. Development of innovative products and services could be delayed if entrepreneurs fear a loss of intellectual property rights from projects developed under the TPI umbrella. In an effort to encourage new and innovative projects the administrators should allow bidders to retain the intellectual property rights.

3.5.2 Reduce Contracting Period Length

3.5.2.1 Research Findings

To the extent that some projects have seasonal constraints, the administrators should beware of the ramifications of contract delays. For example, maintenance of HVAC systems tends to be seasonal, occurring outside of the heating and cooling seasons. In another example, home improvement (e.g. window replacement) is likely to occur during the spring and summer, implying that any market-transformation-related educational projects should be consistent with this schedule. For projects like these, the timing of the delay could pose significant problems for sponsors if they are not in the field on time.

3.5.2.2 Recommendations

Where possible, the administrators should be sensitive to the timing and seasonal nature of particular projects. To the degree that contract delays alter project schedules, the administrators should try to speed up their contract completion.

3.6 IMPLEMENTATION PROCESS

Despite initial confusion over who would be chosen as the final program administrator and delays in executing contracts, the projects did get off the ground. For the most part the sponsors accepted their roles as independent purveyors of EE services and products. There were initial requests for assistance in marketing, and the use of UDC logos was an issue during the earlier phases of the program. Once sponsors were denied assistance, they accepted their roles and for the most part produced a product that participants described as valuable and worthy of recommendations. There are no specific areas for improving the implementation phase. However there were a few issues raised by sponsors that are more related to policy responses.

- **The use of UDC logos when marketing products.** With the described goal of market transformation and sustainability, the use of UDC logos would seem to defeat this goal. Sponsors felt the equity that the UDCs had built up in the area of energy expertise, and trust, was being wasted by limiting the use of UDC logos. However, we think that the use of UDC logos will only slow the shift to sustainable private sector markets for EE products and services, and should therefore remain outside of the program's scope.
- **Hands-off vs. hands-on management.** Some sponsors requested intervention in project implementation due to difficulties within the project team. Generally project managers did take a hands-off approach, monitoring the project's success and focusing on approving invoices. When advice was offered or sought, the sponsors were pleased and appreciative. Generally the feedback from sponsors was that UDC management of their contracts was sufficient and un-intrusive.

The implementation phase of the project went as intentioned, very hands-off, just as any private business should be. Given the goal of sustainable business development, the implementation should remain hands-off, thereby reducing any weaning period that may be required with a more hands-on approach.

4. PROJECT ASSESSMENT OVERVIEW

This section serves two purposes: to provide a detailed description of the Gap/Overlap Analysis, and to describe the data used for both the process evaluations and the market assessments. The Gap/Overlap Analysis will be covered first.

4.1 THE GAP/OVERLAP ANALYSIS METHOD OF MARKET ASSESSMENT

This overview provides a detailed description of the construction and presentation of the project assessments to follow. Each project assessment presents a view of the market addressed by that program, as well as the interactions between the market barriers, intervention strategies, and program elements.

Each market assessment is an initial characterization of the market, based on publicly-available information. In-depth characterizations of all major markets is strongly recommended. The graphical representation of the linkages between market participants, barriers, interventions, and programs quickly reveals the gaps and overlaps in aggregate program efforts to cover the market. A market assessment of this type should be used as a primary basis for energy efficiency program design, implementation and refinement, and it can be used by policy planners at the UDC and/or CBEE level, as well as third parties.

The Gap/Overlap Analysis is completed in five steps: (1) Identification of Related Programs, (2) Identification of Market Participants, (3) Identification and Linkage of Market Barriers, (4) Identification and Linkage of Intervention Strategies, and (5) Identification and Linking of Program Elements.

In addition to the program and market analysis, each project assessment includes an estimation of the sustainability of the market transformation efforts. Each of these steps is described in detail below.

Exhibit 4-1
Assessing the Importance of Market Barriers, Intervention Strategies, and Programs
Step 1 of 5: Identification of Related Programs

Program	Description	Utility Sponsors				Funding ($000)*	Sources
		SCE	SoCalGas	PG&E	SDG&E		
TPI Programs							
Duct Efficiency Program	Provides HVAC and/or sheet metal contractors information to market duct leakage inspection and repair services.	●	●	●	●	615	1998 TPI Proposal
Ongoing and Planned California Programs							
Residential Retrofit & Renovation	(1) Promotion and Facilitation of Comprehensive, Discretionary Retrofit Service; (2) Facilitation of Efficiency Retrofit at Time-of-Sale or Renovation/ SPC which promotes building envelope improvements, including duct sealing.; (3) Energy Efficiency Center(s)	●				6,377	SCE 1999 Advice Filings
Residential Retrofit & Renovation	Home Energy Fitness; Energy Facts; CHEERS; Contractor Program; 3rd party: Upstream Water heater; 3rd party Energy Efficiency Renovation Service; 3rd Party Time-of-Sale Home Inspection Energy Awareness		●			7,389	SoCalGas 1999 Advice Filings
Residential Retrofit & Renovation	(1) Promotion and Facilitation of Comprehensive, Discretionary Retrofit Service/ SPC which promotes building envelope improvements, including duct sealing; (2) Facilitation of Efficiency Retrofit at Time-of-Sale or Renovation; (3) General Information, Education, Branding, Labeling, Alliances; (4) Energy Efficiency Center(s)			●		7,334 (1) 1,542 (2) 4,589 (3) 1,475 (4) 14,490 (Total)	1999 PG&E Advice Filing Update
Residential Retrofit & Renovation	(1) Promotion and Facilitation of Comprehensive, Discretionary Retrofit Service; (2) Facilitation of Efficiency Retrofit at Time-of-Sale or Renovation/ SPC which promotes building envelope improvements, including duct sealing.; (3) Energy Efficiency Center(s)				●	5,663	1999 CBEE Filing
Ongoing and Planned California Programs (Continued)							
Residential Standard Performance Contract	Provides posted prices for energy savings delivered by customers or third party providers. Promotes building envelope improvements, including duct sealing.	●	●	●	●	2,400 (SCE only)	1998 Advice Filings (These have been integrated into the R&R program for 1999)
Previous Utility Initiatives							
PG&E Comfort Home (PCH)	Provides incentives to builders encouraging them to build single family dwellings that exceed Title 24 cooling standards by at least 20% (Title 24 contains codes for duct system leakage and installation issues.)			●		6,000	1998 PG&E Budget ('93-'97); This program has become part of the integrated new construction program for the 1999 PY.
Residential Design Assistance	To identify and capture energy saving opportunities in new construction projects, and to ensure meeting of Title 24 standards in new residential construction. (Title 24 contains codes for duct system leakage and installation issues.)			●	●	350 (SDG&E) 2,060 (PG&E)	1998 SDG&E Budget, 1998 PG&E Budget
Related Programs (e.g., National efforts)							
NEEA Duct Repair	Defines standards for duct repair, develops an alliance of trained contractors, and markets duct repairs to consumers.					760	Northwest Energy Efficiency Alliance Home Page
Energy Star	Provides information on duct repair materials via the Internet and print material.						Energy Star Home Page
Comfort Seal	Provides duct testing and repair, financial incentives, and financing options.						Eugene Water & Electric Board Website, Impact Evaluation Conducted by Eugene Power
Sheet Metal and Air Conditioning Contractors' National Association	Provides contractor training and certification, and standards for duct repair and testing.						SMACNA Website
FPL Duct Testing and Repair	Provides duct testing and contractor training for duct repair, customer-contractor linkages, and financial incentives for each repair.					8,363 (Estimated for 1998)	Florida Power and Light Literature

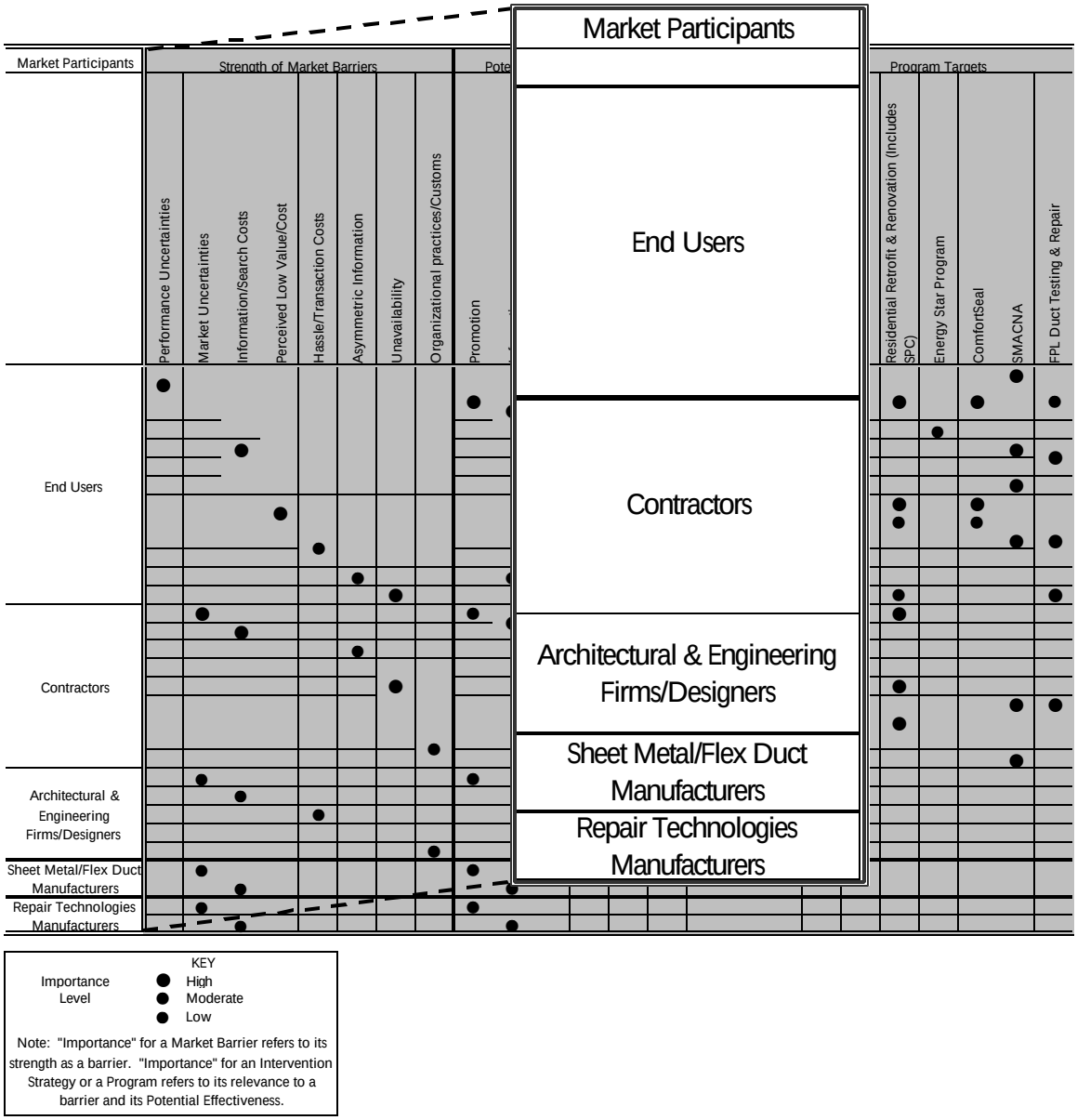
4.1.1 Identification of Related Programs

The starting point of the Gap/Overlap Analysis is the identification of programs that are related either by market, by technological target or by approach. This step provides an initial view of which market participants have already been identified and targeted through energy efficiency programs. Exhibit 4-1 provides a description of the programs related to the TPI Duct Efficiency Program.

A brief description of each program shows how it is related to the market, as well as which market participants are targeted. The level of funding, when available, provides some estimate of the effort and importance placed on each element.

In reality, the market characterization could be completed without this step; however, this helps set the stage for avoiding overlapping intervention efforts.

Exhibit 4-2
Assessing the Importance of Market Barriers, Intervention Strategies, and Programs
Step 2 of 5: Identification of Market Participants

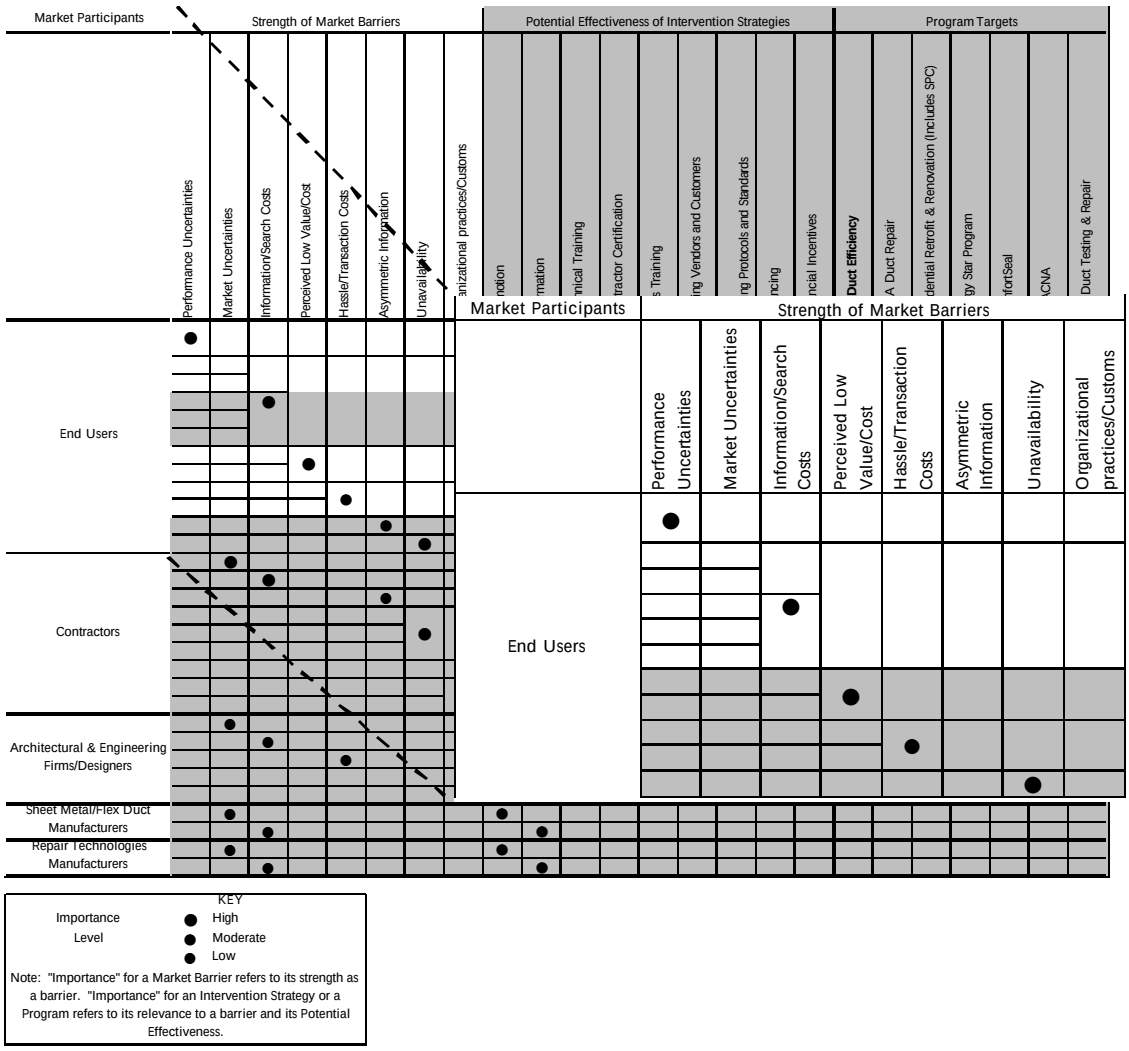


4.1.2 Identification of Market Participants

As shown in Exhibit 4-2, each type of market participant is identified. Market participants include all persons or entities affecting the operation of the market. Ideally, they would be listed in order of importance to the targeted market.

Although most market assessments to date focus primarily on end users, characterizing the entire market and all market participants is extremely important to successful market transformation efforts. Under-emphasizing potentially important market participants could result in ineffectual program implementation strategies, and therefore unnecessarily slow market transformation. The correct and complete identification of all primary market participants is therefore essential.

Exhibit 4-3
Assessing the Importance of Market Barriers, Intervention Strategies, and Programs



Step 3 of 5: Identification of Market Barriers

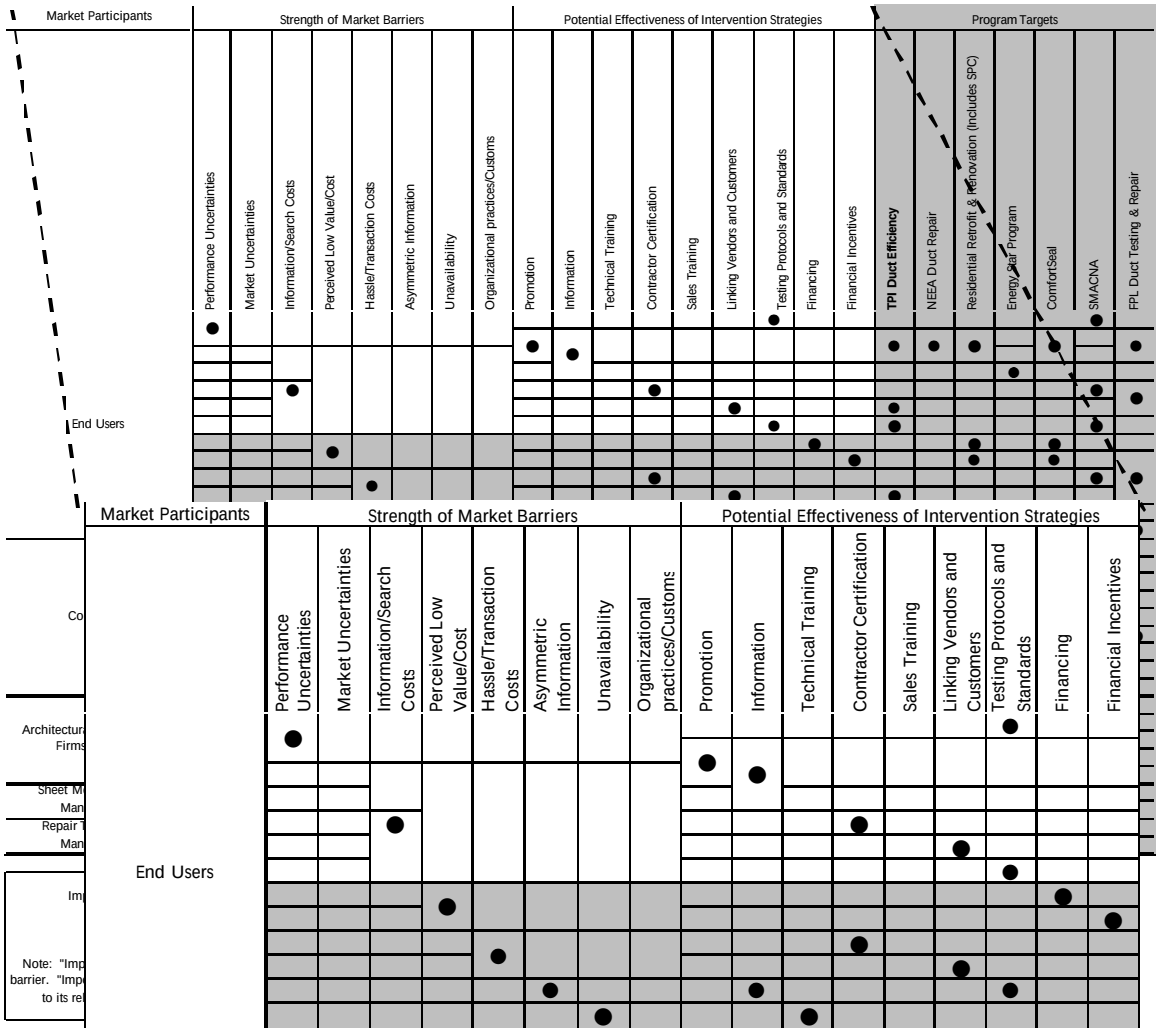
4.1.3 Identification and Linkage of Market Barriers

Once a market participant, or potential market participant, is identified, the barriers to market entry facing each participant are identified and ranked. The ranking indicates how difficult it is for the market participant to overcome this barrier. A list of market barriers and their definitions appears at the end of this section.

Identifying the barriers as they apply to each market participant is the most essential portion of this step in the Gap/Overlap Analysis. How each market participant group perceives a barrier determines, in part, the appropriate intervention strategies for those participants.

The relevant market barriers are also indicated in order of importance as they apply to the most important market participant (in general, from left to right). Using the Duct Efficiency program as an example, end users are felt to be the most important participants and *Performance Uncertainties* are their most important barrier. Since they do not experience market uncertainties, *Information and Search Costs* are the second-most important barrier, and so on. This process is repeated for each market participant group.

Exhibit 4-4
Assessing the Importance of Market Barriers, Intervention Strategies, and Programs



Step 4 of 5: Identification of Potential Effectiveness of Intervention Strategies

4.1.4 Identification and Linkage of Intervention Strategies

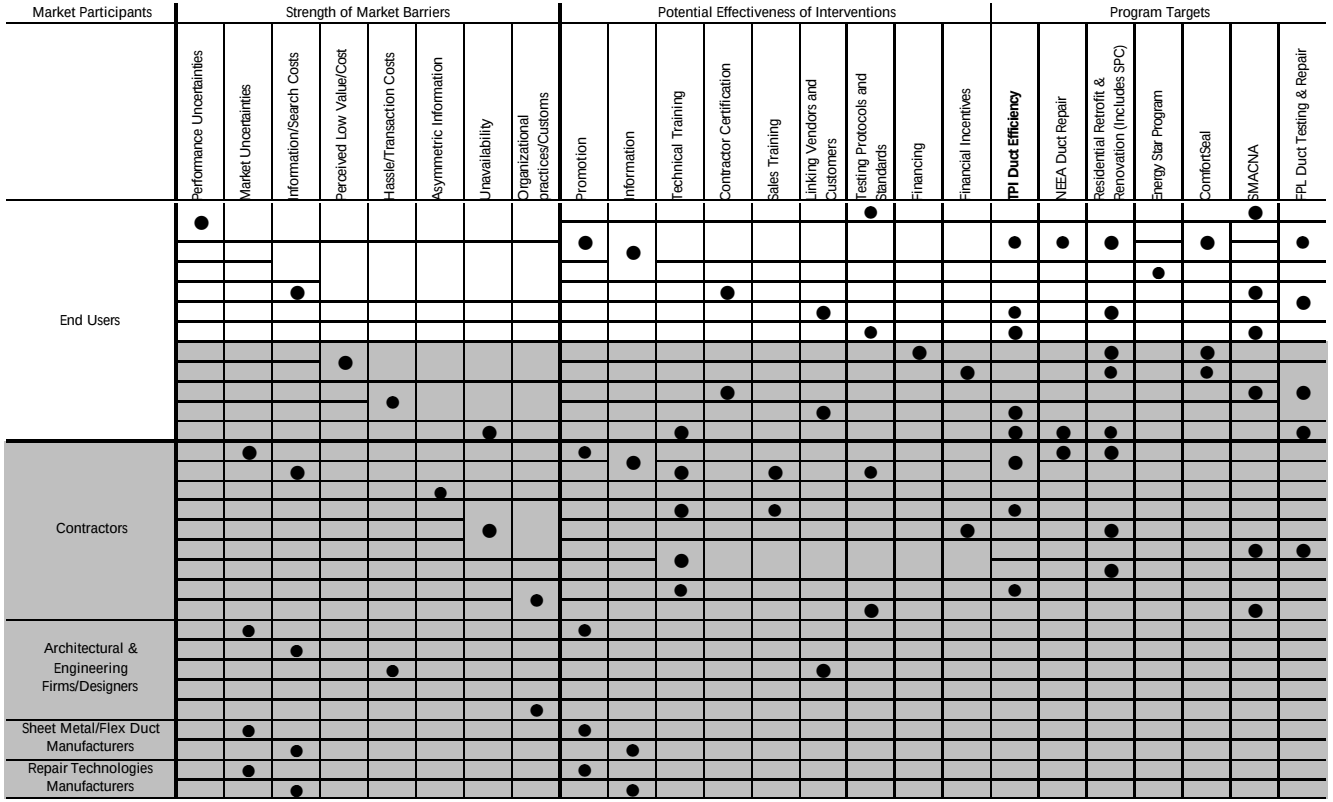
This step in the Gap/Overlap Analysis not only identifies appropriate intervention strategies, but also links them to the targeted market participant/market barrier combinations. A list of intervention strategies and their definitions appears at the end of this section.

The key to the intervention and barrier linkage step is to ensure effective and efficient barrier reduction. A clear picture of the linkages will show that some barriers can be significantly reduced or eliminated using one intervention strategy, while others may require a combination of interventions to be effective. The goal however is not to make duplicative efforts. For example, as shown in Exhibit 4-4, *Contractor Certification*, *Linking Vendors and Customers*, and (to a lesser extent) *Testing Protocols and Standards* are three of the interventions that — along with promotional and informational programs (not highlighted in this example) — may effectively reduce end users' *Information and Search Costs*.

Also shown in Exhibit 4-4, the development of and adherence to *Testing Standards and Protocols* in addition to *Informational Programs* may assist the reduction of end users' *Performance Uncertainty*, and *Technical Training* for contractors may increase the number of contractors performing the services, thereby reducing *Unavailability* to end users.

Considering and identifying all possible combinations and uses of intervention strategies is the goal of this phase of the Gap/Overlap Analysis. This is an important step in determining where there may be gaps and overlapping efforts in current and planned intervention efforts.

Exhibit 4-5
Assessing the Importance of Market Barriers, Intervention Strategies, and Programs
Step 5 of 5: Identification of Program Targets



4.1.5 Assessment of Potential Effectiveness

In this step in the analysis, the elements of the TPI program (and related programs) are linked to market participant/barriers/interventions to provide an indication of the potential effectiveness of the TPI program in question. That is, through this Gap/Overlap Analysis, the innovativeness of the TPI program in addressing important market needs not addressed by other programs can be assessed, synergisms with related programs can be identified, and areas in which the TPI program is merely duplicating other efforts can be identified.

Continuing with our example, *Contractor Certification* designed to reduce *Information and Search Costs* for *End Users* is not an element of the TPI program, but is provided in California by the Sheet Metal and Air Conditioning Contractors' National Association (SMACNA) (in addition, this intervention has been found to be effective in other parts of the country, such as in FPL's Duct Testing and Repair program). *Linking Vendors and Contractors* is a moderately important part of the TPI Duct Efficiency program, and is an important element in California's planned Residential Retrofit and Renovation program. Synergisms between the two programs are obviously important. The moderately important (from the perspective of addressing the *End Users Information and Search Costs* barrier) *Testing Protocols and Standards* intervention is an important feature of the TPI Duct Efficiency program, and is a major element of SMACNA's efforts.

Furthermore, the important (from an *End User* perspective) barrier regarding the *Unavailability* of qualified duct repair contractors is addressed by the key *Technical Training* feature of the Duct Efficiency program. This is also a key feature of the NEEA Duct Repair program, and a moderately important part of California's Residential Retrofit and Renovation programs. Lessons learned in the Northwest should, of course, be applied to California.

In summary, by combining "importance ratings" for end users and related barriers with "potential effectiveness" ratings for related intervention strategies, the overall importance of an end user/barrier/intervention strategy can be assessed. Analyzing the degree to which the TPI programs address important needs (either in combination with or separate from other activities) provides a good indication of the potential effectiveness of the TPI program.

4.1.6 Potential for Sustainability

The Gap/Overlap Analysis presents a picture of a market by linking all actors to the barriers they face and the intervention strategies that may effectively reduce these barriers. While this type of analysis provides useful information for program planning and assessment resources, it does not, however, answer questions related to sustainability. Specifically, whether or not the effects of the program elements will make sustainable reductions in the barriers facing market participants remains an open question. To resolve this issue for Third Party Initiative (TPI) programs, the QC Team assembled a series of questions to determine whether the eventual removal of intervention strategies will result in a sustainable change.[1]

To assess whether the changes made by the programs will remain permanent after the program is no longer in place, the following questions are considered.

- *Is someone making money by offering it?* — If suppliers will profit from continuing to offer the product or service offered by the program, the actor will be more likely continue to do this in the absence of the program.

- *Has the profession or trade adopted it as standard practice?* — If the product or service becomes accepted as standard practice, those using (now outdated) methods will be phased out of the market, due to the perception that they are not meeting the industry standards.

- *Would it be difficult or costly to revert to earlier equipment or practices?* — If it is easy to change back to the previous practices, and the main incentive to change to more cost-effective methods is provided through the program, once the program incentives are absent previous practices will likely become the standard again.

- *Has there been a steady growth in market share?* — If there is evidence of increasing market share, there is obviously evidence that the product/service in question is moving closer to sustainability.

- *Are end users requesting or demanding it?* — If these market actors want the product or service, and are willing to pay for it, someone will be willing to provide it without other incentives.

- *Have the risks to private market actors been reduced or removed?* — If the risks, especially financial risks, have been reduced or removed, it will become more attractive to market participants to remain in/enter the market.

- *Are purchasers satisfied with it?¾* If purchasers are satisfied, they will continue to demand the product or service, and will recommend it to others, increasing market penetration.

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[1] The basis for these questions comes from discussions at the 1999 ACEEE Market Transformation Workshop and exchanges between project staff.

Obviously, many of these factors are interdependent. This is not meant to be the complete or definitive list of factors to analyze when assessing potential sustainability. Rather, it allows for an initial discussion of the sustainability of the targeted markets.

4.1.7 Market Barriers and Intervention Strategies Defined

Using the market barriers and intervention strategies as defined by Eto, et. al., as a starting point, we have defined some additional market barriers.[2] Some of these new barriers are refinements of and/or expansions of the original set, based on the desire to make a further distinction between multiple items previously considered jointly, while others further apply specifically to non-end-user market actors. In the cases where market barrier and intervention strategy titles are very descriptive, they have not been defined. The definitions for market barriers are presented in Exhibits 4-6 and 4-7.

[2] Source: CBEE Technical Service Consultants (Joe Eto, Ralph Prahl, Dr. Jonathan Raab, and Jeff Schlegel) February 4, 1998 Memo; Proposed Recommendations to CBEE on Program Classification, Cost Effectiveness, Capability of Transforming Markets, and Market Assessment and Evaluation.

Exhibit 4-6
Market Barriers Defined

Access to Financing*	The inability of consumers to obtain appropriate financing for the product or service.
Asymmetric Information / Opportunism*	The tendency of sellers of energy efficiency to have more and better information about their offerings than do consumers.
Bounded Rationality*	The behavior of an individual during the decision-making process that seems or actually inconsistent with the individual's goals.
Focus Too Narrow	The business concentration of the service or product provider which does not allow for them to expand their offerings.
Hassle / Transaction Costs*	The indirect costs of acquiring energy efficiency, including the time and labor involved in purchasing or contracting for an energy efficient product or service.
Hidden Costs*	Unexpected costs associated with reliance on or operation or energy efficient products or services.
High Capital Costs	The cost of making changes to production facilities and / or sales methods to sell a new product.
Information / Search Costs*	The cost of identifying energy-efficient products or services or learning about energy-efficient practices.
Lack of Product Knowledge	The ignorance of vendors about their product and the resulting inability to sell it.
Market Uncertainties	The difficulty suppliers and manufacturers face in evaluating the market's reception of the product or service.
Organizational Customs and Practices *	Organizational behavior or systems of practice that discourage or inhibit cost-effective energy efficient decisions.
Perceived Low Value / Cost Ratio	The belief of the consumer that the cost of the product or service outweighs the value.
Performance Uncertainties*	The difficulty consumers face in evaluating claims about future benefits.
Title 24	Codes or standards that do not allow the use or implementation of new technologies.
Split Incentives*	The incentives of the agent charged with purchasing energy efficiency are not aligned with those of the persons who would benefit from the purchase.
Unavailability*	The failure of manufacturers, distributors, or vendors to make a product or service available in a given area or market.

*Source: *A Scoping Study on Energy-Efficiency Market Transformation by California DSM Programs.* J. Eto, R. Prahl and J. Schlegel. July 1996

Exhibit 4-7
Intervention Strategies Defined

Alliances	Vertical integration of market between upstream and downstream market actors (i.e., forming a relationship between contractors and suppliers).
Audit	An assessment of a building's energy efficiency made by a trained inspector.
Contractor Certification	An assurance that a given contractor is knowledgeable about the product or service, verified through training and / or testing.
Demonstration	Providing demonstration of the use / performance of energy efficient technologies to market actors.
Design Assistance	Providing recommendations on building or product design.
Financing	Providing loans to finance the acquisition of a product or service.
Financial Incentives	Per measure dollars provided to market participants (generally either end users or contractors) to encourage energy conservation measure installation.
Information	Passive provision of information to market participants.
Linking Vendors & Customers	Providing customer contacts to contractors, or contractor / vendor contacts to customers.
Non-financial Incentives	Products, changes in procedures, or administrative consolidation to encourage product or service provision.
Promotion	Active advertising and information made available to the market.
Rebates	Rebates to consumers to help offset the additional cost for the purchase of energy efficient equipment.
Sales Training	Providing sales, marketing and / or technical training about products or services to individuals responsible for selling it.
Standards, Labeling	Setting specific standard levels for energy efficient technologies. Labeling these technologies accurately for easy consumer / contractor recognition.
Technical Information	Provision of technical information on energy efficienct products or services.
Technical Support	Providing answers to technical questions from market actors about energy efficient products / services after installation.
Third Party Verification	Inspection and verification provided by an unbiased party on the results of an inspection to insure correct product or service performance.

Note: The intervention strategies have all been defined by Quantum Consulting.

4.2 DATA SOURCES

This section provides a general description of the primary and secondary data sources used to evaluate the TPI Program in general, and the individual TPI projects specifically. The primary data mainly support the process evaluation of the TPI Program (covered in the third chapter of this report), while the secondary data aids in the project assessments—there was considerable overlap for both portions of the evaluation.

The TPI Evaluation Uses and Sources Explanation (USE) Chart — in which the relationship between each data source and the evaluation objectives is described — is presented in Exhibit 4-8, below. As illustrated in this exhibit, program and project manager interviews, project sponsor focus groups, and participant surveys contribute most significantly to the process evaluation. The TPI and CBEE program-related materials are further used to support these findings.

The analyses of TPI project proposals, advice filings, market transformation materials, technology characterizations, national and regional market transformation materials, and market assessment references are the major contributions to the project assessment, also shown in Exhibit 4-8. Interview and survey results are used to enhance and confirm the results of the project assessment.

Descriptions of the collection efforts of both the primary and secondary data follow.

Exhibit 4-8
Evaluation USE Chart

Uses / Sources	Research Plan	Interview Guides & Lists	Process Evaluation						Project Assessment			
			Program/Project Design	Program/Project Implementation	Gap/Overlap Analysis	Cross-sectional Analysis	Hypothesized Mechanism for Measuring Effectiveness	Innovativeness	Gap/Overlap Analysis	Market Transformation Prospects	Barrier Assessment	Cost Effectiveness
Project Initiation Minutes	●	●										
Interviews/Focus Groups with TPI Program Administrators	●		●	●	●	●	●	●	●	●	●	●
Interviews/Focus Groups with TPI Sponsors			●	●	●	●	●	●	●	●	●	●
Interviews with Unselected TPI Sponsors			●	●	●	●		●	●	●		
TPI Project Participant Surveys				●	●				●	●	●	●
TPI Procedures & Processes			●	●			●					
TPI Program Materials			●	●								
Selected TPI Project Proposals			●	●	●		●		●	●	●	●
TPI Project Materials				●		●	●					●
Unselected TPI Project Proposals			●	●		●				●	●	●
CBEE 1999 Planned Program Materials					●		●	●	●	●	●	●
UDC Managed EE Program Materials			●		●			●	●	●	●	●
Market Transformation Literature			●		●		●	●	●	●	●	●

KEY
Importance
● High
● Moderate
● Low

4.2.1 Primary Data Collection

The primary data collection is comprised of three main parts: interviews with program and project managers at the UDCs, focus groups and interviews with project sponsors, and surveys of program participants. The tally of primary data collection is as follows:

- Six interviews were conducted with the TPI program managers at each of the four participating UDCs—PG&E, SCE, SDG&E and SoCalGas.

- Ten interviews were conducted with UDC project managers.
- Two focus groups were conducted with 20 of the selected project sponsors.
- Five follow-up interviews were conducted with members of the focus groups to clarify the opinions expressed, and to collect further information.
- Four interviews were conducted with project sponsors whose projects were selected, but did not attend either of the focus groups.
- One hundred seventy-two surveys were conducted with participants from one of two state-wide programs, or a third single-UDC program.

4.2.1.1 Program and Project Manager Interviews

Interviews with program and project managers solicited descriptions of the RFP, solicitation, selection, contracting, and implementation processes, the perceived successes and failures of the processes, and recommendations for changing the processes in the future.

4.2.1.2 Project Sponsor Focus Group and Interviews

The focus group collected information and opinions about all the processes involved in preparing a proposal for a TPI project. The focus group included only sponsors whose projects had been selected for funding by at least one of the UDCs. The additional information collected from follow-up interviews with some of the sponsors corroborated the results of the focus groups.

4.2.1.3 Program Participant Surveys

These surveys gathered information about program participant experiences and satisfaction with the programs in which they participated. These participants were not end users, but direct beneficiaries of the training and materials provided by the programs. Many of these participants were contractors or sales professionals. The surveys focused on two state-wide projects, and one single-UDC project.

4.2.2 Secondary Data Collection

The secondary data library is comprised of six main parts: TPI Program materials, California market transformation and resource acquisition advice filings, related California market transformation program and assessment summary materials, national/regional market transformation materials, technology characterization references, and market assessment references. These materials were used mainly for the assessment of the individual TPI Projects.[3]

[3] A list of all secondary data sources is presented in Appendix A.

4.2.2.1 TPI Program Materials

These materials included proposals from this year's project sponsors, TPI project descriptions, RFP's from each of the UDCs, and project selection criteria. From the sponsors, we requested examples of their marketing advertising materials, study plans, evaluation reports, and their customer/project database to use for conducting participant surveys. Due to an overwhelming lack of response to this request, we used mainly the UDC-related materials to evaluate TPI projects' innovation, cost-effectiveness and relative success. This allowed us to determine whether each particular initiative is worth replicating.

4.2.2.2 California Market Transformation and Resource Acquisition Advice Filings

These materials include current program year as well as historical advice filings. These advice filings describe past and present programs, allowing for comparison between UDC-sponsored programs and TPI programs, on cost-effectiveness, innovative market transformation efforts, unnecessary barriers to participation, and unwanted behavioral responses (such as free-ridership).

4.2.2.3 Related California Market Transformation Program and Assessment Summary Materials

Collection and review of the available market transformation literature was important in determining the relative effectiveness of each project's contribution to the efforts to transform California's markets for energy efficient products and services. Policymakers and the TPI project sponsors must be in agreement concerning the market effects defining market transformation in order to meet a common goal.

4.2.2.4 National/Regional Market Transformation Materials

These included materials such as the Northwest Energy Efficiency Alliance Program materials and Energy Star Program materials, and were used to compare related TPI programs for delivery mechanisms, cost-effectiveness, and general market trends (when available). This also allowed discovery of possible future alliances between TPI Programs and other programs.

4.2.2.5 Technology Characterization References

This information was used to characterize the technological market relevant to each program. This characterization helps create a baseline of current energy efficient technologies and services to assist in measuring against the initiative's technology.

4.2.2.6 Market Assessment References

These references, combined with the market transformation materials listed above, assisted in characterizing each energy efficient market, with regards to defining its consumers, producers, distributors, and other market actors. In addition, they provided necessary information about the baseline sales and distribution of each technology or service addressed by the TPI programs.

5. DUCT EFFICIENCY PROGRAM

5.1 DUCT EFFICIENCY PROGRAM ¾ OVERVIEW AND TECHNICAL POTENTIAL

The Duct Efficiency Program is a relatively low-budget program attempting—along with other retrofit and renovation programs—to continue stimulation of the duct efficiency industry in California.

5.1.1 Program Overview

The Duct Efficiency Program provides technical training for duct repairs to improve their quality and effectiveness. In addition the program offers marketing and sales training to help contractors develop their business. When compared to previous and continuing duct efficiency programs there appears to be a lot of overlap, in particular in the area of technical training. The DEP does however represent a departure, and innovation, through its marketing and sales training. Surveys with training session attendees revealed that they found both valuable.

While attendees viewed the training as valuable, project managers said that actually getting contractors to attend was somewhat difficult. The main impediment, according to project managers, was the timing of the training sessions. Specifically, during the summer months contractors were reticent to send staff to training sessions for two days when they could be working instead. Scheduling training during slack months may improve attendance. Overall the project managers felt the program was successful accomplishing its stated goals of increasing the number of trained contractors, providing them with marketing and sales materials, and increasing awareness among consumers.

5.1.2 Program's Technical Potential

There is significant potential to increase the average efficiency of residential duct systems in California and nationwide; however this market is in its infancy. A description of the market and its technical potential are presented below.

- Duct repair has significant technical potential in California.
  - In a recent PG&E study, potential DSM program areas as yet unexplored by PG&E were examined. In the residential sector, retrofit duct sealing was estimated to have high energy-savings potential. Potential savings for the PG&E and surrounding service territories are estimated to be 186 GWh and 5 Tbtu by 2010 with annual savings of 656 kWh and 68 Therms per repair.[1] New construction duct sealing was estimated to contribute savings of 43.44 GWh.

[1] Source: PG&E DSM Potential Study Volume 1: Selecting Targets for New Market Transformation Initiatives, July 1997

- The ACEEE estimates that duct repair can contribute a national energy savings of 15.4 TWh and 203.2 Tbtu.[2]

- The most likely effects of this program on the duct efficiency industry in California are:
  - An increased pool of contractors in California who are qualified to perform effective duct repairs and install more energy-efficient duct systems. This increase in competition could drive down the price and increase the availability of the duct repair services. Whether this will occur solely through competition, or in conjunction with contractors' bundling of HVAC and duct services is uncertain.
  - Increased consumer awareness and understanding of the long-term effects of duct-system efficiency, including more effectively operating HVAC systems, and improved home air quality.

[2] Source: ACEEE Selecting Targets for Market Transformation Programs: A National Analysis, August 1998

Exhibit 5-1
Duct Efficiency Market Assessment
Related Program Identification

Program	Description	Utility Sponsors				Funding ($000)*	Sources
		SCE	SoCalGas	PG&E	SDG&E		
TPI Programs							
Duct Efficiency Program	Provides HVAC and/or sheet metal contractors information to market duct leakage inspection and repair services.	●	●	●	●	615	1998 TPI Proposal
Ongoing and Planned California Programs							
Residential Retrofit & Renovation	(1) Promotion and Facilitation of Comprehensive, Discretionary Retrofit Service; (2) Facilitation of Efficiency Retrofit at Time-of-Sale or Renovation/ SPC which promotes building envelope improvements, including duct sealing.; (3) Energy Efficiency Center(s)	●				6,377 (Planned for 1999)	SCE 1999 Advice Filings
Residential Retrofit & Renovation	Home Energy Fitness; Energy Facts; CHEERS; Contractor Program; 3rd party: Upstream Water heater; 3rd party Energy Efficiency Renovation Service; 3rd Party Time-of-Sale Home Inspection Energy Awareness		●			7,389 (Planned for 1999)	SoCalGas 1999 Advice Filings
Residential Retrofit & Renovation	(1) Promotion and Facilitation of Comprehensive, Discretionary Retrofit Service/ SPC which promotes building envelope improvements, including duct sealing; (2) Facilitation of Efficiency Retrofit at Time-of-Sale or Renovation; (3) General Information, Education, Branding, Labeling, Alliances; (4) Energy Efficiency Center(s)			●		7,334 (1) 1,542 (2) 4,589 (3) 1,475 (4) 14,490 (Total) (Planned for 1999)	1999 PG&E Advice Filing Update
Residential Retrofit & Renovation	(1) Promotion and Facilitation of Comprehensive, Discretionary Retrofit Service; (2) Facilitation of Efficiency Retrofit at Time-of-Sale or Renovation/ SPC which promotes building envelope improvements, including duct sealing.; (3) Energy Efficiency Center(s)				●	(Planned for 1999)	1999 CBEE Filing
Residential Standard Performance Contract	Provides posted prices for energy savings delivered by customers or third party providers. Promotes building envelope improvements, including duct sealing.	●	●	●	●	2,400 (SCE only)	1998 Advice Filings (These have been integrated into the R&R program for 1999)
Previous Utility Initiatives							
PG&E Comfort Home (PCH)	Provides incentives to builders encouraging them to build single family dwellings that exceed Title 24 cooling standards by at least 20% (Title 24 contains codes for duct system leakage and installation issues.)			●		6,000	1998 PG&E Budget ('93-'97); This program has become part of the integrated new construction program for the 1999 PY.
Residential Design Assistance	To identify and capture energy saving opportunities in new construction projects, and to ensure meeting of Title 24 standards in new residential construction. (Title 24 contains codes for duct system leakage and installation issues.)			●	●	350 (SDG&E) 2,060 (PG&E)	1998 SDG&E Budget, 1998 PG&E Budget
Related Programs (e.g., National efforts)							
NEEA Duct Repair	Defines standards for duct repair, develops an alliance of trained contractors, and markets duct repairs to consumers.					760	Northwest Energy Efficiency Alliance Home Page
Energy Star	Provides information on duct repair materials via the Internet and print material.						Energy Star Home Page
Comfort Seal	Provides duct testing and repair, financial incentives, and financing options.						Eugene Water & Electric Board Website, Impact Evaluation Conducted by Eugene Power
Sheet Metal and Air Conditioning Contractors' National	Provides contractor training and certification, and standards for duct repair and testing.						SMACNA Website
FPL Duct Testing and Repair	Provides duct testing and contractor training for duct repair, customer-contractor linkages, and financial incentives for each repair.					8,363 (Estimated for 1998)	Florida Power and Light Literature

* In some cases, costs were broken out for each program component.

5.2 DUCT EFFICIENCY PROGRAM ¾ RELATED PROGRAMS

Although duct efficiency as a self-sustaining industry is relatively immature, rebate and informational programs have been used to develop this market. Exhibit 5-1 presents an overview of related utility programs, as well as programs from other areas of the country.

- The Third-Party Initiative (TPI) Duct Efficiency Program has three main components:
  - Sales and marketing training to assist contractors' building their own businesses and to help spread duct repair information to potential customers.
  - Technical training for contractors to administer effective duct tests and repairs, as well as proper duct installation techniques.
  - Advertising to potential customers to increase awareness of efficient duct benefits.
- When compared to related programs, the TPI Duct Efficiency Program differs primarily because it offers sales training and marketing information to contractors. This aspect of the program provides contractors with ready-to-use tools for business expansion.
- The most closely related program, due to its use of the similar intervention efforts – especially on the end use side, is the Northwest Energy-Efficiency Alliance Duct System Program.
- The Residential Renovation and Retrofit Programs planned for all UDCs in 1999 will provide training and distribute information to promote entire home envelope retrofits, which include duct testing and repair.
  - The Residential Contractor program, part of the 1999 Residential Renovation and Retrofit Program, encourages duct repairs through financial incentives. Both the number of installations and the verified energy savings form the basis for paying incentives.
  - At PG&E, this program also offers technical training to contractors on a number of home energy efficiency topics, which may include duct testing and repair through its Energy Efficiency Center.
  - Both PG&E's Comfort Home (PCH) and SDG&E's Residential Design Assistance Programs also paid incentives to either the customer or the contractor to perform a duct repair. These programs also included marketing efforts concerning duct efficiency that were targeted directly at the consumer.
- The Sheet Metal and Air Conditioning Contractors' National Association (SMACNA) concentrates on the technical training aspect of duct efficiency services. Like the TPI program, SMACNA offers technical training and duct testing and repair guidelines for purchase, but goes one step beyond to offer a certification to contractors who complete the technical training. The TPI sponsor indicated previous activities in cooperation with SMACNA; this may indicate these procedures and standards are similar or identical.
- Florida Power & Light's Duct Testing and Repair Program, the largest rebate-driven program in the country, combines many of the intervention techniques used by other duct efficiency programs. The FPL program uses contractor training and certification, financial incentives, and information and advertising.

Exhibit 5-2
Duct Efficiency Market Assessment
Identification of Market Barriers

Market Participants	Strength of Market Barriers							
	Performance Uncertainties	Market Uncertainties	Information/Search Costs	Perceived Low Value/Cost	Hassle/Transaction Costs	Asymmetric Information	Unavailability	Organizational practices/Customs
End Users	●							
			●					
				●				
					●			
						●		
							●	
Contractors		●						
			●					
						●		
							●	
								●
Architectural & Engineering Firms/Designers		●						
			●					
					●			
								●
Sheet Metal/Flex Duct Manufacturers		●						
			●					
Repair Technologies Manufacturers		●						
			●					

KEY

Importance Level
● High
● Moderate
● Low

Note: "Importance" for a Market Barrier refers to its strength as a barrier. "Importance" for an Intervention Strategy or a Program refers to its relevance to a barrier and its Potential Effectiveness.

5.3 DUCT EFFICIENCY PROGRAM ¾ MARKET BARRIERS

The barriers associated with each market participant are presented in Exhibit 5-2.[3] This analysis is based upon a thorough review of secondary data sources described in Section 5.2 and interviews with the project managers and sponsors. The analysis revealed that an important barrier for *End Users* is *Performance Uncertainty*.[4] Analysis of the remaining barriers is presented below.

- Regarding performance incentives, many end users are uncertain about the cost-effectiveness and energy savings resulting from the repair, and are therefore reluctant to procure duct efficiency services.

- The market uncertainties barrier is fairly important to contractors, but is much less significant for architectural and engineering firms/designers (A&E firms), sheet metal/flex duct manufacturers (manufacturers), and duct repair technologies manufacturers (manufacturers).
  - Generally, contractors have full workloads during peak seasons, and are unwilling to commit resources to an unproven business area.
  - For A&E firms and manufacturers, the barrier is much less significant due to the diversity of their businesses. Regardless of whether or not the duct efficiency industry grows, the investments of time and capital for these supply-side actors will be a small percentage of their overall investments.

- Given the relatively immature nature of the duct efficiency market, information and awareness are limited; therefore, information and search costs are high. High search costs also apply to contractors for two primary reasons:
  - Due to the relative immature nature of the duct efficiency market, information about techniques and practices are limited, therefore raising the costs of learning.
  - Contractors also lack the market information needed to assuage their uncertainties about the market for duct efficiency services.

- Another important barrier to end user participation is the perceived low value/cost ratio.
  - Research conducted by the project team in another service territory found that the number of duct repairs correlates well to the incentive amount.

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[3] Section 4.1 presents a detailed discussion of the market assessment method.

[4] While it can be argued that *Lack of Awareness* is a more important potential barrier, a review of active programs outside of California shows that even when customers are aware of the duct repair programs, they still do not participate due to *Performance Uncertainty* and *Perceived Low Value/Cost Ratio*.

- In California, one study reports that on average, a duct repair costs between $450 and $650, and provides and estimated savings of 658 kWh/year.[5] Using PG&E's average residential electricity rates of $0.12/kWh, and an average duct repair price of $550, the payback for a duct repair would be 7 years. No mechanism for reducing duct testing and repair costs is provided in the literature, although the PG&E study does hypothesize reduction in duct sealing costs of 40 percent (from $450 to $270) when using aerosol-based duct sealing methods.
- The price of a duct test is not included in this cost calculation because the contractor providing the duct repair service often is the same contractor who performed HVAC maintenance and/or installation and discovered leaks in the duct work at that time. Furthermore, since blower doors and duct blasters are expensive (ranging between $1,200 and $2,000), contractors perform most tests using smoke or visual inspection.

- Hassle and/or transaction costs, though less important than the actual service costs, may dissuade consumers when they must find a contractor and then be available at the time of the service.

- For design firms, hassle and/or transaction costs are a less significant barrier, as this might be considered part of the cost of doing business. Needing to educate the contractors to properly install the changed design might be an example of a hassle or transaction cost for system designers. For example, if a representative of the design firm is required to meet with the contractor to convey the new design, this would imply a hassle cost.

- The possibility of asymmetric information is of moderate importance to end users. They may not truly understand what the contractor is doing to the duct system, and may have difficulty judging the benefits of the repair.

- Unavailability of duct efficiency services affects end users and contractors in different ways.
  - In the case of the end user, he cannot procure the services when they are unavailable, which obviously makes it a very important barrier.
  - For the contractor, with slightly less importance, service unavailability appears on several different levels: the technology and/or knowledge may be unavailable, or the contractor may choose not to make the service available due to uncertainties about market demand for the service.

- Organizational practices or customs are of moderate concern for contractors and A&E firms. If duct efficiency services or designs are not in the business portfolio of offerings, it is unlikely that the firm will suddenly begin offering them without being convinced that it will benefit from offering these services.

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[5] Source: PG&E DSM Potential Study Volume 1: Selecting Targets for New Market Transformation Initiatives, July 1997; Furthermore, Florida data from QC's internal library indicates there is evidence that a positive relationship between repair time /repair cost and impact.

Exhibit 5-3
Duct Efficiency Market Assessment
Assessing the Potential Effectiveness of Intervention Strategies

Market Participants	Strength of Market Barriers								Potential Effectiveness of Intervention Strategies								
	Performance Uncertainties	Market Uncertainties	Information/Search Costs	Perceived Low Value/Cost	Hassle/Transaction Costs	Asymmetric Information	Unavailability	Organizational practices/Customs	Promotion	Information	Technical Training	Contractor Certification	Sales Training	Linking Vendors and Customers	Testing Protocols and Standards	Financing	Financial Incentives
End Users	●								●	●					●		
			●									●					
				●										●			
					●							●		●			
						●				●					●		
							●				●						
Contractors		●							●	●							
			●								●		●		●		
						●					●		●				
							●				●						●
											●						
								●			●				●		
Architectural & Engineering Firms/Designers		●							●								
			●		●									●			
								●									
Sheet Metal/Flex Duct Manufacturers		●							●								
			●							●							
Repair Technologies Manufacturers		●							●								
			●							●							

KEY

Importance Level
- ● High
- ● Moderate
- ● Low

Note: "Importance" for a Market Barrier refers to its strength as a barrier. "Importance" for an Intervention Strategy or a Program refers to its relevance to a barrier and its Potential Effectiveness.

5.4 DUCT EFFICIENCY PROGRAM ¾ INTERVENTION STRATEGIES

The TPI Duct Efficiency Program has selected a small number of interventions to address two key groups of market participants, end users and contractors. The remaining market participants play a much smaller role in the market, and as such receive minimal focus. Exhibit 5-3 provides a picture of how each intervention strategy maps to each market barrier. For example, the most important market barrier for *End Users* is *Performance Uncertainties*, which can be reduced through *Promotion* and *Information* and to a certain extent through *Testing Protocols and Standards*. Descriptions of the potential intervention strategies, and how they address the market barriers, are presented below.

- Promotion from a credible source reduces end user information and search costs and performance uncertainties. Market uncertainties may be reduced for contractors as customers gain awareness of the service and its benefits.

- Informational programs can reduce performance uncertainties, information and search costs, and asymmetric information.
  - For end users, readily accessible information from a credible source is highly effective in reducing search costs and performance uncertainties. Effective promotion of duct efficiency services may include testimonials on the benefits of duct repair.
  - Providing consumers with information on the true benefits of duct repair, instead of relying on salespeople or contractors, may reduce asymmetric information.
  - For contractors, information is imperative in the reduction of market uncertainties. In order for contractors to be convinced that the market is viable, they must see quantitative evidence of demand for the service. This may be best received in the form of a market characterization, including production costs and potential profits.

- Technical training, another important intervention, may be effective for contractor barrier reductions.
  - In recent interviews with 27 residential contractors conducted for the Residential SPC Program evaluation, respondents indicated that they do not value training in repair, only in testing and computer-based analysis.[6]
  - Technical training, if effective in increasing supply of duct efficiency services, will reduce unavailability to end users.
  - A&E firms or designers may also benefit from technical training tailored to their needs, as it has the potential to significantly reduce the cost of searching for relevant technical information.

[6] Study conducted by Wirtshafter and Associates, Inc.; December 1998

- Certification may allow contractors to differentiate themselves from other HVAC or sheet metal contractors. The certification may also effectively reduce information search costs and hassle or transaction costs to end users, as it makes identifying qualified contractors easy. This would be akin to a Good Housekeeping label, or another accepted seal of approval.

- Sales training may help contractors build their duct repair business.

- Linking vendors of the duct efficiency service to customers is important in providing newly entering contractors an immediate market of customers. This linkage can also be very important in reducing both information and search costs, and hassle and transaction costs, to the end user.

- Testing protocols and standards may be important in reducing performance uncertainties for contractors as well as end users. As standards are widely accepted, anticipated results and the quality of the duct efficiency services are easier to gauge, producing a higher level of confidence in the service.

- Financing may assist the end user in reducing inspection or repair costs and the subsequent long payback period. For many end users, the perceived low value/cost ratio may be a very strong deterrent to having duct efficiency services provided, but if the financial obligation can be spread over a longer period of time, as with a financing plan, this deterrent may be successfully reduced. Residential performance contracts, where many energy efficiency services are provided together, may be considered as an alternative form of financing.

- Financial incentives may be instrumental in reducing or eliminating end users' perceived low value/cost ratio. These incentives also encourage more contractors to become involved in duct efficiency services, helping increase availability of the service.

- There are intervention strategies effective at addressing the market barriers facing A&E firms and manufacturers; however, the barriers these market participants face are so minimal it is unlikely that an outside program is required.

Exhibit 5-4
Duct Efficiency Market Assessment
Identification of Program Targets

Market Participants	Strength of Market Barriers								Potential Effectiveness of Intervention Strategies									Program Targets						
	Performance Uncertainties	Market Uncertainties	Information/Search Costs	Perceived Low Value/Cost	Hassle/Transaction Costs	Asymmetric Information	Unavailability	Organizational practices/Customs	Promotion	Information	Technical Training	Contractor Certification	Sales Training	Linking Vendors and Customers	Testing Protocols and Standards	Financing	Financial Incentives	**TPI Duct Efficiency**	NEEA Duct Repair	Residential Retrofit & Renovation (Includes SPC)	Energy Star Program	ComfortSeal	SMACNA	FPL Duct Testing & Repair
End Users	●														●								●	
									●	●								●	●	●		●		●
																					●			
			●									●											●	●
														●				●	●					
															●			●	●				●	
				●												●				●		●		
																	●			●		●		
					●							●											●	●
														●				●	●					
						●				●					●			●	●					
							●				●							●	●	●				●
Contractors		●							●															
			●							●	●		●		●			●	●					
						●																		
											●		●					●						
							●										●			●				
											●												●	●
																				●				
								●			●							●						
															●								●	
Architectural & Engineering Firms/Designers		●							●															
			●																					
					●									●										
								●																
Sheet Metal/Flex Duct Manufacturers		●							●															
			●							●														
Repair Technologies Manufacturers		●							●															
			●							●														

KEY

Importance Level
- ● High
- ● Moderate
- ● Low

Note: "Importance" for a Market Barrier refers to its strength as a barrier. "Importance" for an Intervention Strategy or a Program refers to its relevance to a barrier and its Potential Effectiveness.

5.5 DUCT EFFICIENCY PROGRAM ¾ ASSESSMENT OF POTENTIAL EFFECTIVENESS

The TPI Duct Efficiency Program has the potential to address contractors' and end users' market and performance uncertainties, and their related search costs – important barriers to successful and efficient market transformation. Exhibit 5-4 summarizes the key features of the TPI Duct Efficiency Program in terms of both the intervention strategies offered by the program to address targeted market effects barriers and the potential effectiveness of the TPI program elements. Key features of related program programs are also presented to allow an assessment of the synergies (and possible overlaps) among programs, and to identify areas where the TPI program has the potential to target needs not addressed elsewhere. Key observations are presented below.

- The TPI program, although similar in many respects to other programs, has the potential to reduce the strongest barriers facing end users. In addition, the TPI program has the potential to effectively address contractors' barriers with technical and sales training, therefore search and transaction costs for such information. In fact project managers felt that the program successfully trained contractors, and therefore increased the pool of potential firms offering duct repairs.

- The NEEA Duct Repair program uses most of the same approaches as the TPI program, but neglects to provide contractors with the sales and marketing tools to promote duct efficiency services on their own. The main related service this program provides is linking vendors and customers.

- The ComfortSeal Program, relatively effective in increasing the number of households having duct efficiency services performed, concentrates its efforts heavily on providing information and promotion to reduce performance uncertainties for end users.

- The Energy Star Program inadequately and ineffectively covers information and search costs to end users. The minimal information provided through this program is unlikely to make a lasting impression on the barriers to market entry of any market participant.

5.6 DUCT EFFICIENCY PROGRAM – IMPLEMENTATION EFFECTIVENESS

Through strategies such as training and marketing targeted at contractors, the TPI Duct Efficiency Program takes an innovative approach relative to its predecessors and peers. UDC program and project managers viewed the provision of marketing materials for contractors to use in promoting their duct repair business as innovative. Interviews with participating contractors, program sponsors, and the UDC managers pointed to a successful program. In general the project got off the ground without any problems. Initially there was some contention over the use of UDCs logos and databases, but these issues were quickly resolved. Interviews with contractors participating in the training sessions stated that they found the training useful, and of high quality. In addition, one project manager felt that the program had been successful in increasing awareness of duct repairs within the contractor community. This innovative approach is possibly the key to sustained market effects. At this stage in the program it unclear whether the program could become self sufficient in the near term.

5.7 DUCT EFFICIENCY PROGRAM ¾ POTENTIAL FOR SUSTAINABILITY

By using non-financial intervention strategies such as training and marketing, the TPI Duct Efficiency Program should be considered innovative when compared to other programs. Review of previous exhibits shows some overlap with other programs, but a departure by focusing on contractors rather than end-users.

- The most likely market effects of a program like this in California are:
  - An increased pool of contractors in California who are qualified to perform effective duct repairs and install more energy-efficient duct systems. This increase in competition may also drive down the price of the duct repair services, and help increase demand for them.
  - An effective change in organizational customs and practices. This possible effect of the TPI Duct Efficiency Program is not noted in the proposal. By convincing contractors to train for and market duct efficiency services, the standard practices of targeted businesses may change as these contractors begin to institute duct efficiency service offerings as part of their businesses. This is imperative to increasing the supply of such services. Participating contractors stated that the training was effective and that they were likely to carry on with the repairs.
  - An increased number of consumers who demand duct repair services. When customers understand the long-term effects of duct-system efficiency, including energy savings and improved home comfort, they will be willing to pay for it and will seek out the services. Interviews with 325 duct repair participants, from another service, showed that the primary reason for participating is energy savings – thus the importance of the value/cost ratio in moving this market.

5.8 DUCT EFFICIENCY PROGRAM – SUMMARY

As mentioned throughout this section, the program's greatest innovation is its use of contractors as the vessel for promoting duct inspection and repair. Previous programs concentrated mainly on providing incentives to end-users to conduct duct repair. Most participating contractors stated that they viewed the program as a low cost business opportunity, and therefore worth the investment of their time. The program appears to target a group of seemingly reluctant individuals successfully, therefore increasing the probability of having a sustainable effect.

6. HIGH PERFORMANCE WINDOWS

6.1 HIGH PERFORMANCE WINDOWS — OVERVIEW AND TECHNICAL POTENTIAL

The Third-Party Initiative (TPI) High Performance Windows Program is designed to increase awareness and education of high efficiency fenestration products, training of upstream actors.

6.1.1 Program Overview

The TPI High Performance Windows Program attempts to continue stimulation of the fenestration industry in California by providing sales and marketing training, as well as technical information, to glass manufacturers, window manufacturers and distributors, and stores or other agents who sell windows.

6.1.2 Program's Technical Potential

High efficiency windows have significant technical potential in California. A recent PG&E study examined the potential of unexplored DSM program areas. The study found that, in the total residential sector, retrofit window replacement was shown to have high energy savings potential, with potential savings of 78 GWh and 3 Tbtu in 2010 for the PG&E territory and some of its surrounding territories.[1]

The ACEEE estimates that high efficiency windows can contribute to national energy savings by 10000.0 GWh and 128.5 Tbtu.[2]

According to the project sponsors, the most likely market effects of this program in California are:

- Increased promotional efforts associated with high efficiency windows.
- Increased inventory stock levels.
- Increased manufacture and distribution of high efficiency windows.
- Increased variety of performance levels of windows.
- Increased demand for high efficiency fenestration products due to better understanding of energy-saving benefits.

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[1] Source: PG&E DSM Potential Study Volume 1: Selecting Targets for New Market Transformation Initiatives, July 1997

[2] Source: ACEEE Selecting Targets for Market Transformation Programs: A National Analysis, August 1998

Exhibit 6-1
High Efficiency Windows Market Assessment
Related Program Identification

Program	Description	Utility Sponsors				Funding ($000)	Sources
		SCE	SoCalGas	PG&E	SDG&E		
TPI Programs							
TPI High-Efficiency Windows Program	Provides training to upstream and midstream market actors to affect the information provided to the consumer at the point of purchase.	●		●	●	995	
Ongoing and Planned California Programs							
Residential Retrofit & Renovation	(1) Promotion and Facilitation of Comprehensive, Discretionary Retrofit Service; (2) Facilitation of Efficiency Retrofit at Time-of-Sale or Renovation/ SPC which promotes building envelope improvements, including high-efficiency windows.; (3) Energy Efficiency Center(s)	●				6,377 (Planned for 1999)	SCE 1999 Advice Filings
Residential Retrofit & Renovation	Home Energy Fitness; Energy Facts; CHEERS; Contractor Program; 3rd party: Upstream Water heater; 3rd party Energy Efficiency Renovation Service; 3rd Party Time-of-Sale Home Inspection Energy Awareness		●			7,389 (Planned for 1999)	SoCalGas 1999 Advice Filings
Residential Retrofit & Renovation	(1) Promotion and Facilitation of Comprehensive, Discretionary Retrofit Service; (2) Facilitation of Efficiency Retrofit at Time-of-Sale or Renovation/ SPC which promotes building envelope improvements, including high-efficiency windows; (3) Energy Efficiency Center(s)				●	(Planned for 1999)	1999 CBEE Filing
Residential Retrofit & Renovation	(1) Promotion and Facilitation of Comprehensive, Discretionary Retrofit Service/ SPC which promotes building envelope improvements, including high-efficiency window replacement; (2) Facilitation of Efficiency Retrofit at Time-of-Sale or Renovation; (3) General Information, Education, Branding, Labeling, Alliances; (4) Energy Efficiency Center(s)			●		7,334 (1) 1,542 (2) 4,589 (3) 1,475 (4) 14,490 (Total) (Planned for 1999)	1999 PG&E Advice Filing Update
Previous Utility Initiatives							
NFRC Window Rating System	Works with the NFRC to label high-performance windows and specify high-performance standards.			●		230	1998 PG&E Advice Filing
Residential Energy Efficient Windows Program	Promotes installation of high efficiency windows through education, advertising, financing, incentives, and industry collaboration.			●		600	1998 PG&E Advice Filing
PG&E Comfort Home (PCH)-Super Cool	Provides incentives to builders encouraging them to build single family dwellings that exceed Title 24 cooling standards by at least 20% (Title 24 contains codes for minimum window efficiency.)			●			1996 PG&E Budget (for 1993 only). The program focused on high-efficiency windows during 1993 only by providing financial incentives to builders. After that, the focus changed to education and window shading devices.
Related Programs (e.g., National efforts)							
High-Efficiency Window Products	In conjunction with industry and Energy Star initiatives, this launches a comprehensive awareness campaign.					1,600 (over 2 years)	NEEA Website
Energy Star High-Efficiency Window Labeling Program	Voluntary partnership between the U.S. Department of Energy and the fenestration industry to promote sales of energy efficient door, windows, and skylights. Also, labels windows with U-values and provides a map to indicate whether the windows are appropriate for the area.						Energy Star Website
Build Smart Program (Formerly Super Good Cents)	Certifies apartment and condominium buildings which are designed and built to conserve energy. Measures include high-efficiency windows.						Seattle City Light

6.2 HIGH PERFORMANCE WINDOWS — RELATED PROGRAMS

Since high-efficiency fenestration products are not the standard for new construction and retrofit, informational and rebate programs are important to the promotion of this market. Exhibit 6-1 presents an overview of related utility programs, as well as programs sponsored at the national level.

- The TPI High Performance Windows Program differs from most of the others because it offers sales and marketing information and training to the "upstream" actors responsible for manufacturing and sales inventory decisions. This aspect of the program allows for a potential "trickle-down" effect where the training occurs at the top of the supply chain and the information spreads through the chain to the end users.

- Through the 1999 Residential Retrofit and Renovation Programs, each UDC provides training and distributes information to promote entire home envelope retrofits, which includes window retrofits with high efficiency windows.

- The Residential Standard Performance Contract (ResSCP), which has become part of the Residential Renovation and Retrofit Program for the 1999 program year, encourages window retrofit through financial incentives paid separately for proper installation and for performance, determined through verified energy savings.
  - At PG&E, this program also offers technical training to contractors on a number of home energy efficiency topics, including high efficiency windows, through its Energy Efficiency Center.
  - PG&E's latest windows program, a cooperative effort with the National Fenestration Rating Council (NFRC), worked to label high-performance windows and specify technological standards for the windows.
  - PG&E's Comfort Home (PCH) paid incentives (during the 1993 program year only) to contractors to install windows surpassing Title 24 insulation standards by at least 20 percent. This program also engaged in marketing efforts targeted directly at the consumer concerning window efficiency.

- The Northwest Energy Efficiency Alliance (NEEA), in conjunction with ENERGY STAR®, is sponsoring a comprehensive awareness campaign about high efficiency windows. The campaign's main focus is to provide information about high efficiency windows to consumers.

- The Build Smart™ Program, sponsored by Seattle City Light, is designed to promote the building of energy efficient homes by linking builders, vendors, and customers. The Build Smart™ home must have high performance windows installed.

Exhibit 6-2
High Efficiency Windows Market Assessment
Identification of Market Barriers

Market Participants	Strength of Market Barriers							
	Lack of Product Knowledge	Market Uncertainties	High Capital Costs	Low Perceived Value/Cost	Performance Uncertainties	Information/Search Costs	Asymmetric Information/Opportunism	Unavailability
Product Sources - Distributors, Large Retailers	●							
		●						
			●					
						●		
								●
Upstream Sales Agents - Builders, Realtors, Other Sales Professionals	●							
		●						
					●			
						●		
								●
Manufacturers		●						
			●					
Buyers & Agents - Architects and specifiers, and end-use customers				●				
					●			
						●		
							●	
								●

KEY

Importance Level
- ● High
- ● Moderate
- ● Low

Note: "Importance" for a Market Barrier refers to its strength as a barrier. "Importance" for an Intervention Strategy or a Program refers to its relevance to a barrier and its Potential Effectiveness.

6.3 HIGH PERFORMANCE WINDOWS — MARKET BARRIERS

The barriers associated with each market participant are shown in Exhibit 6-2. This analysis is based upon a review of secondary literature sources described in Exhibit 6-1, and interviews with project managers and sponsors.[3] Analysis revealed that the most important barrier for *Product Sources* participants is *Market Uncertainties*. This group, which includes distributors, and large retailers, are not assured sales of these products to *End Users*. Without more confidence in sales potential, they are less likely to stock the windows.

- These market uncertainties are also significant to upstream sales agents, as they are unlikely to take the risk of stocking these windows without some indication of potential reward. In turn, manufacturers may be unwilling to make the windows.

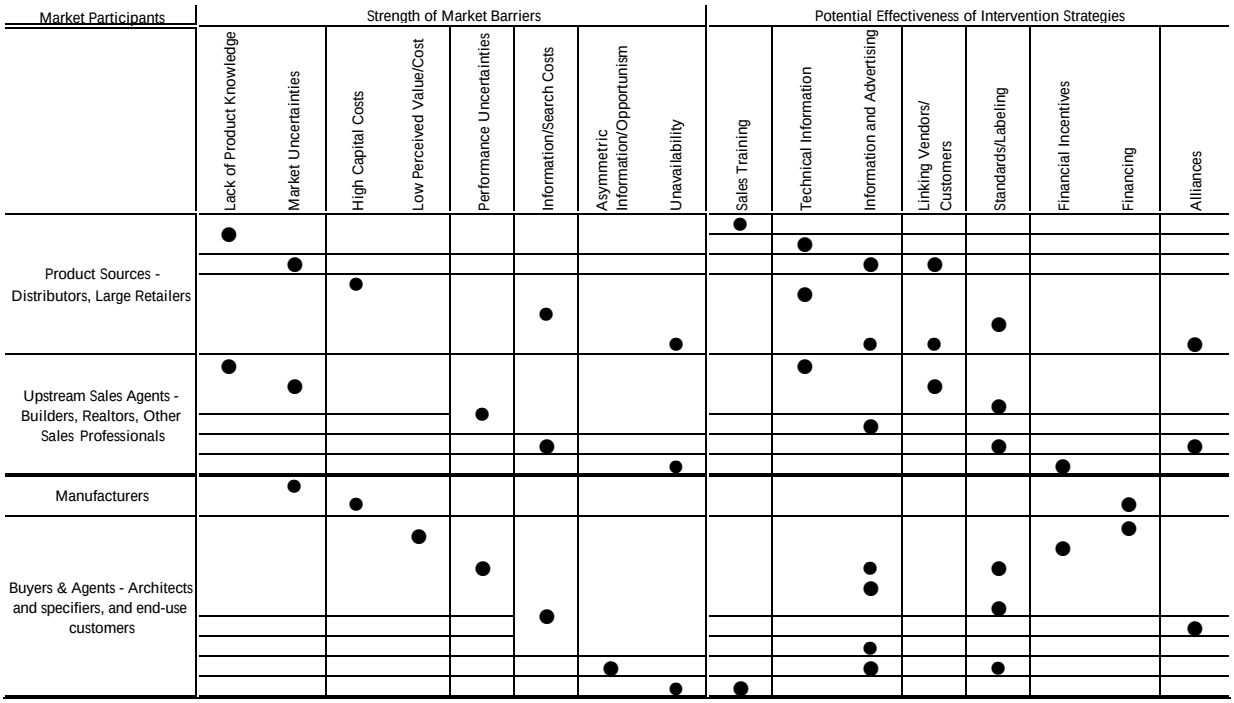
- The performance uncertainties barrier, an important barriers facing buyers, is linked to the perceived low ratio of value to cost since the uncertainties blur the true value of the high efficiency windows. In the case where the energy savings potential is not common knowledge, fewer people will be likely to spend the marginal extra amount of money for the high performance window.

- Information and search costs are important to product sources, sales agents and buyers, but for different reasons.
  - For product sources, these costs are very closely tied to market uncertainties. The uncertainties may exist due to the lack of information about the market potential of high performance windows.
  - Because sales agents have to spend time, energy, and money to be trained about the new products, it is easier to sell the product they already know.
  - For buyers, the information and search costs are probably the highest, as they have the most money to lose per individual in making an uninformed high performance windows decision.
- Asymmetric information and opportunism are important to buyers because the sales agents know more about the high-efficiency windows than buyers do.

- Product unavailability only applies to distributors and large retailers in the product sources category. Obviously, these actors can only distribute the product if it is available.

[3] Section 4.1 presents a detailed discussion of the market assessment method.

Exhibit 6-3
High Efficiency Windows Market Assessment
Assessing the Potential Effectiveness of Intervention Strategies



6.4 HIGH PERFORMANCE WINDOWS — INTERVENTION STRATEGIES

An important intervention strategy to potentially increasing the market penetration of high performance windows is *Sales Training* to decrease the *Lack of Product Knowledge* in product sources and upstream sales agents. The TPI High Performance Windows Program selected *Sales Training* as their intervention to address barriers faced by *Product Sources* and *Sales Agents*. Other interventions that may be effective in this market are addressed below.

- Sales training, an important intervention affecting product sources, is key in diminishing market uncertainties, performance uncertainties, information and search costs.
  - For product sources, sales training, and technical information can lower market uncertainties by providing information on the potential market. An effective sales staff, resulting from training, has the potential to increase profitability and decrease market uncertainties.
  - For upstream sales agents, the sales training addresses the same barriers as above, with a similar outcome. This type of training potentially improves the ability of upstream sales agents to sell and stock high performance windows.
  - Buyers and agents become secondary beneficiaries of the sales training through the information gained by the other two groups of market actors. Their performance uncertainties and information and search costs can be significantly affected by this training. To a lesser extent, this intervention may also help reduce product unavailability.

- Information and advertising may reduce product unavailability. If information and advertising increase demand, suppliers could have incentive to stock, thereby reducing unavailability.

- For buyers and agents, readily accessible information and advertising from a credible source are highly effective in reducing the search costs and performance uncertainties. Effective promotion of high performance windows may offer feedback to customers on increased home comfort resulting from better windows.

- Education, including market and potential customer information, can be highly effective in reducing market uncertainties for product sources by increasing awareness.

- For buyers and agents, education is imperative to reducing information and search costs. To a lesser degree, this also reduces performance uncertainties by providing performance information directly to the buyer.

- Linking customers and vendors may be highly effective in diminishing market uncertainties for both product sources and upstream sales agents. This linking effectively provides a group of assured or nearly assured, customers, encouraging more of these actors to enter the market.

- Standards and labeling can be important in decreasing performance uncertainties and information and search costs to both upstream sales agents and buyers and agents. Standards can effectively provide a means for comparing the performance differences between fenestration products, rather than relying on claims made by manufacturers or distributors. Labeling simply makes this information readily available.

- Financial incentives are most important to the buyer and agents, as they help reduce the additional cost of high performance windows.

- Financing may assist the buyer in reducing product and installation costs and the subsequent payback period. For many end users, a perceived low value to cost will be a very strong deterrent to installing high-efficiency windows. However, if the costs can be spread over a longer period, as with a financing plan, this deterrent may be successfully reduced.

- Financing can also be helpful to reducing manufacturers' high entry costs.

- Alliances bring manufacturers, distributors and sales agents together to actively promote high efficiency window products. By working together, the alliance can streamline communication, thus reducing information and search costs. Additionally, market uncertainty can be reduced by making a concerted effort to develop, market, and sell the product.

Exhibit 6-4
High Efficiency Windows Market Assessment
Identification of Program Targets

Market Participants	Strength of Market Barriers								Potential Effectiveness								Program Targets							
	Lack of Product Knowledge	Market Uncertainties	High Capital Costs	Low Perceived Value/Cost	Performance Uncertainties	Information/Search Costs	Asymmetric Information/Opportunism	Unavailability	Sales Training	Technical Information	Information and Advertising	Linking Vendors/ Customers	Standards/Labeling	Financial Incentives	Financing	Alliances	**TPI High Performance Windows**	Energy Star	NEEA High-Efficiency Windows Products	Residential Renovation & Retrofit	NFRC Window Rating System	Residential Energy Efficiency Windows Program	PCH - Super Cool	Build Smart Program
Product Sources - Distributors, Large Retailers	●								●															
										●							●							
		●									●	●						●	●					
			●							●							●							
						●																		
													●								●			
								●			●	●				●		●	●					
Upstream Sales Agents Builders, Realtors, Other Sales Professionals	●									●							●							
		●										●												●
					●						●		●								●			
						●							●			●		●	●					
								●						●									●	
Manufacturers		●	●												●									
Buyers & Agents - Architects and specifiers, and end-use customers				●											●					●				
														●										
					●						●		●				●							
											●							●				●		
						●							●								●		●	●
											●					●		●		●				
							●				●		●				●	●			●			
								●	●								●							

KEY

Importance Level
- ● High
- ● Moderate
- ● Low

Note: "Importance" for a Market Barrier refers to its strength as a barrier. "Importance" for an Intervention Strategy or a Program refers to its relevance to a barrier and its Potential Effectiveness.

6.5 HIGH PERFORMANCE WINDOWS ¾ ASSESSMENT OF POTENTIAL EFFECTIVENESS

The TPI High Performance Windows Program has the potential to addresses upstream and midstream market actors' market and performance uncertainties and their related search costs — the most significant barriers to increasing market participation. Exhibit 6-4 maps the intervention strategies of the TPI and related programs to their targeted market participants. Key features of related programs from Section 6.2 are provided to give a clear picture relative other window efforts. The potential effectiveness of each intervention is rated in the exhibit and discussed below.

- The TPI High Performance Windows Program concentrated its work toward reducing the barriers facing manufacturers, product sources and sales agents. The program provided sales training to help increase the sales of the high performance windows. This program works so effectively that it has helped change product inventory at some of the large retail outlets in California.

- The ENERGY STAR® and the Northwest Energy Efficiency Alliance (NEEA) High Efficiency Windows Programs are the only other programs targeting intervention strategies at product sources. In addition, consumer education is likely to make a sustainable increase in demand as the benefits of high performance windows become widely known and accepted.

- The Residential Retrofit and Renovation (R&R) and the Comfort Home Super Cool Programs target buyers mostly by providing financial incentives. They also offer information, but the financial incentives are most likely to make the programs appealing to consumers. Because of this, although these programs are likely to be relatively effective in the short term, the increased sale of windows is unlikely to be sustained after the programs' end.

- The NFRC Windows Rating System targets standards and labeling to convey the technical specifications of high performance windows. When combined with a campaign to increase consumer information about benefits of high efficiency windows, labeling can make a sustainable shift in consumer demand. As this labeling system effectively rates more windows, informed consumers are able to more easily distinguish between different high performance windows.

- The Residential Energy Efficiency Windows Program increases the number of windows sold by offering financing to buyers. The financial incentives offered by this program, however, are unlikely to be sustainable in the long run.

- The Build Smart™ Program links vendors and customers, and promotes standards and labeling of windows for use in new construction. Unless the builder finds it profitable to continue to using high performance windows, the mix of windows would probably revert to pre-program levels once the program ends.

6.6 HIGH PERFORMANCE WINDOWS ¾ IMPLEMENTATION EFFECTIVENESS

The TPI High Performance Windows program was fairly effective in distributing energy efficient window information to its target audience – upstream actors. The program was able to meet or nearly meet its goal of educating upstream actors in sales and marketing of high performance windows. Interviews with attendees stated that the program was valuable, and worth their time. In addition the program was able to act as a conduit for information up and down the supply chain. For example, the program sponsors were able to relay complaints from resellers and builders, to manufacturers, that the windows lacked sufficient labeling to distinguish them between high performance and standard windows.

The program performed remarkably well, according to program managers, given its late start. For the SCE territory the program did not make it into the field until mid-summer of an unseasonably hot year. The significance of this is that the program that windows sales seem to be correlated with milder weather, therefore the expectation was that sales and related stocking practices were not expected to be high. Ironically interviews with program managers revealed that the program was somewhat successful in shifting stocking practices towards high performance windows.

6.7 HIGH PERFORMANCE WINDOWS ¾ POTENTIAL FOR SUSTAINABILITY

Because it uses a specific set of information tailored to fit each group receiving training, the TPI High Performance Windows Program should be viewed as innovative when compared with its predecessors.

- The most likely market effects of a program like this in California are:
  - Increased promotion of high efficiency fenestration products. This will likely lead to increased sales, increased manufacture and distribution of high efficiency windows, and increased inventory stocks.
  - Increased promotion and sales (according to Xenergy predictions), leading to a decrease in the price of high performance fenestration products. Obviously, this is only possible if increased sales and promotion lead to increases in demand.
  - An increased pool of sales agents in California who are knowledgeable about high performance windows.
  - Increased demand by consumers who understand the long-term effects of high performance windows, including energy savings and increased home comfort.
- This program's greatest innovation is the targeting of upstream market actors with sales and technical information. This approach has the potential to force a sustainable shift in the supply of high performance windows, as manufacturers are encouraged to provide more windows in response to greater sales. The change is likely to be sustained, since it is difficult and expensive for manufacturer s to revert to former production practices. However, a drop in demand could lead to a quick retreat.

6.8 HIGH PERFORMANCE WINDOWS ¾ SUMMARY

This program's greatest innovation is the targeting of upstream market actors with sales and technical information. If the program can continue to educate upstream actors the potential for sustainable changes in stocking and purchasing practices is likely to continue.

7. COMFORTWISE™ PROGRAM

7.1 RESIDENTIAL NEW CONSTRUCTION PROGRAM – OVERVIEW AND TECHNICAL POTENTIAL

The ComfortWise™ Program is a residential new construction (RNC) program that seeks to increase energy efficiency in new construction by reducing barriers to builders.

7.1.1 Program Overview

ComfortWise™ is designed to transform the residential new construction market to more energy efficient construction through a voluntary program. From the builder's standpoint, the program attempts to associate increased energy efficiency with increased home value and quality, rather than purely increased costs. The program combines energy efficient design with mechanisms to directly increase the value of the home, such as energy efficiency ratings and mortgages. Promoting energy efficiency in residential new construction holds significant technical potential for creating a more efficient stock of housing. A description of the market is presented below.

- There is basic economic support for creating a market for energy efficient homes. A review of several academic studies found that energy efficiency does increase resale property values. On average there is an increase of $20-$24 in property value for every $1 reduction in the annual fuel bill.[1] This fact is important for the long-run sustainability of energy efficiency in RNC, an energy rating for marketing, and an energy efficient mortgage (EEM).
- Current new home construction equals approximately 64,000 units in PG&E service territory, 37,000 in the LA area (SCE and SoCalGas territories), and 11,000 in SDG&E's service territory. [2] [3] Given the lower cost of adopting energy efficiency during construction (as opposed to retrofitting the home), there can be a large cumulative lost opportunity if efficiency is not adopted in new home construction.

7.1.2 Program's Technical Potential

Significant technical potential exists for the RNC market. Most current RNC efforts (including the TPI effort examined here) have criteria to build homes 30% more efficient than 1993 Model Energy Code (MEC) homes and 20-25% more efficient than California Title 24 regulations.[4]

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[1] "The Market Value of Energy Efficiency: What Have We Learned? What Do We Still Need to Learn?" by Lee et. al., *1998 ACEEE Summer Study*, pp. 2.103-2.113.

[2] The Home Cooling Program by Davis Energy Group, Inc. and Refrigeration Technology, Inc. for Pacific Gas and Electric Company.

[3] ConSol ComfortWise Proposal (SCE, SoCal Gas, SDG&E)

[4] ConSol ComfortWise Proposal (SCE, SoCal Gas, SDG&E); Application No. 97-10-001, Southern California Edison 1998 Filing, Appendix B to the Testimony of Southern California Edison in Support of the 1998 DSM Program

Exhibit 7-1
Residential New Construction Market Assessment
Related Program Identification

Program	Description	Utility Sponsors				Funding ($000)*	Sources
		SCE	SoCalGas	PG&E	SDG&E		
TPI Programs							
ComfortWise	Builder marketing, Home energy ratings, Energy Star, energy efficient mortgages (EEMs), Qualified HVAC layout, 3rd-party inspections, Testing HVAC & shell	●	●		●	635	1998 TPI Proposal
Ongoing and Planned California Programs							
PG&E Integrated Residential New Construction Program	1. Targeted Consumer Protection & Information (incl Energy Star) 2. Infrastructure & Product Development 3. Integrated Energy Star Showcase Homes 4. Capability Development (Training Resource Guide) 5. Market Leader Incentives (partial defray of incr. costs) 6. Manufactured Housing			●		7,015 (1. $1,875 2. $450 3. $500 4. $550 5. $3,500 6. $140)	PG&E 1999 Advice Filings
SCE Integrated Residential New Construction Program	1. Targeted Consumer Protection & Information (incl Energy Star) 2. Infrastructure & Product Development 3. Integrated Energy Star Showcase Homes 4. Capability Development (Training Resource Guide) 5. Market Leader Incentives (support for renewable pilot, no bldr incentives)	●				1,825 (1. $1,118 2. $407 3. $406, 4. $200 5. $40)	1999 SCE Advice Filings
SCG Energy Advantage Home	Home above Title 24, Must have gas water heater and space heating equipment that exceeds minimum efficiency, Advertising campaign and information to builders and lenders, Advertising support for builders, One-to-one builder seminars, Incorporate statewide builder training		●			3,205	SoCalGas 1999 Advice Filings
SDG&E Residential Design Assistance	Design assistance to builders for homes above Title 24				●	350	SDG&E 1998 Advice Filing and 1999 Advice Letter
Statewide Builder Sales Training	Create statewide standard builder sales training for energy efficiency with continuing education credit for renewal of real estate license	●	●	●	●	Statewide	1999 PG&E Advice Filing
Statewide Window & Duct Training	Builder and HVAC subcontractor training offered consistently statewide	●	●	●	●	Statewide	1999 PG&E Advice Filing
Statewide: Builder Resource Guide Book	Utility joint effort to develop guide book with energy efficiency practices, appliances, lighting techn. Advice, and Title 24 compliance tips	●	●	●	●	Statewide	1999 PG&E Advice Filing
Statewide: Manufactured Housing	Statewide market assessment and baseline study	●	●	●	●	Statewide	1999 PG&E Advice Filing
Statewide CHEERS	Non-profit initiated CHEERS system	●	●	●	●	Statewide PG&E: 128, SCE: 375, SCG: 200, SDGE: 150	PG&E 1999 Advice Filing, 1999 SCE Advice Filing, 1999 SCG Advice Filing
CBEE Recommended Programs: 1. Targeted Information to Consumers 2. Promotion of Energy Star Homes Brand/Label 3. Analysis, Training, and Education in Energy Efficient Mortgage Lending 4. Testing and Certification of Homes using CHEERS 5. Preferential Energy-Efficient Mortgage Products for Premium Efficiency Homes 6. Training and Technical Assistance to Builders and HVAC Subcontractors on New Technologies and Practices 7. Financial Incentives and/or Marketing Assistance to Builders of Premium Efficiency Homes 8. Energy Performance Warranties or Bill Guarantees for Home Buyers 9. Design Assistance to Architects, Builders and HVAC Subcontractors on New Technologies and Practices	1. Increase market demand for high efficiency homes by increasing consumer awareness and understanding of the costs and benefits of high efficiency homes. 2. Makes high efficiency homes easier to recognize and increase customer demand for certified home. 3. Increases institutionalization of energy efficient mortgages and full accounting for efficiency in valuation, and will remove institutional financial barriers to rational investment in new home energy. 4. Provides consumers with objective, trustworthy information on the relative energy use of homes and their expected annual energy costs, as well as provide a vehicle for testing and certifying homes as ENERGY STAR homes. 5. Increases market demand for energy efficient homes by creating additional demand at the leading edge of the market. 6. Increases the knowledge, skill level and standard practice of these key players in their construction practices so they can better respond to increased market demand for energy efficiency. 7. Provides transitional support at the leading edge of the market to overcome split incentives and other economic ma					CBEE Advice Filing	

Funding, October 1, 1997; Advice 2086-G/1776-E, Pacific Gas & Electric 1998 Filing, June 5, 1998; Advice 2760, Southern California Gas Company (Sempra Energy) 1999 Filing, November 16, 1998.

Exhibit 7-1, Continued
Residential New Construction Market Assessment
Related Program Identification

Program	Description	Utility Sponsors				Funding ($000)*	Sources
		SCE	SoCalGas	PG&E	SDG&E		
Related Programs (e.g., National efforts)							
Good Cents & Super Good Cents	New home rating programs used by many utilities historically, packaged program marketed by Southern Company						General literature, many utilities
Energy Star New Home	US EPA new home rating program, trying to become national standardized program promoted by all utilities, includes Builder Training material for what practices and materials help meet Energy Star performance, some national marketing and concentrated regional marketing						Energy Star Home Page
Citizens Utilities Company, Arizona Electric Division RNC program w/ Good Cents Program	Good Cents Program (1995-96), pseudo-prescriptive by advising builders on combinations of equipment that would produce acceptable results, R-38 ceiling insul, R-21 wall insul, polysealing of gaps, well sealed AC ducts and AC w/ 11.0 SEER or better, no rebates and achieved 17% penetration (50% FR), not penetrating market for low cost retirement housing						Article in 1998 ACEEE Summer Study Proceedings, Caulfield and Shepherd
Georgia Power's Good Cents & Super Good Cents	Super Good Cents program with up to $2,100 incentive for electrically heated home and $830 for split, 12.5 SEER HVAC, free blower door test, CFLs and water heater measures Good Cents w/ $870 electric home and $210 split w/10.5 SEER AC, 75% FR in Good Cents & 20% FR in Super Good Cents, b/c=0.67						Article in 1995 Energy Program Evaluation Conference Proceedings, Gunel et. al.
Energy Crafted Home in New England	ECH 1991-1995, Regional study for electric utilities in CT, MA, NH & RI, 900 bldgrs part w/ 450 ECH certified homes, significant spillover in air sealing measures w/ 61% bldgrs learned thru ECH program, customers require payback of less than 4.25 years (focused on electric heat -- current regulatory requirement for electric utilities to be fuel blind in RNC), HERS & EEM would help - not accepted at this time						Article in 1995 Energy Program Evaluation Conference Proceedings, Gondek et. al.
MA RNC programs & Builders Guide	MA RNC electric utility program fuel blind, All programs (electric & gas) linking to Energy Star, Demonstrations, Advertising, Developing new Builders Guide (prior one used extensively -- includes not only what standards for Energy Star (ES guide orientation) but explicitly how to do it, Promotion of ee mortgages						Boston Gas Residential new Construction Market Assessment & Baseline Study, 1999/2000; Energy Efficiency Plans for MA electric utilities
4 Stage Process to Res. Building Code in WA	4 Stage process over 15 years: 1) Residential Standards Demonstration Program and Residential Construction Demonstration Program 2) Super Good Cents Program 3) Early Adopter and Northwest Energy Code Program 4) Washington State Energy Code Implementation Program (1991) Process for moving market and acceptance of energy code, Code compliance over 90%, Involved BPA, NW Power Planning, Washington State Energy Office, 60 public & IOU utilities and over 200 local govt., cost utilities $110-120 million, Homebuyers paid $665 million over 1979 code and saved 150 aMW, Cost under 5 mills to utilities, BPA SGC had $5 mill media program & got 75% awareness and 20% penetration, WSEC Compliance Payments to Builders 1991-1995 for $900 for elec. home, WSEO code mandatory to enforce but voluntary program to assist local govt. w/ 1-time funding for computers w/ enforcement tools, training, payment, technical assistance hot line						Article in 1995 Energy Program Evaluation Conference Proceedings, Brandis and Schueler

7.2 RESIDENTIAL NEW CONSTRUCTION PROGRAM ¾ RELATED PROGRAMS

Residential new construction programs have been conducted by numerous utilities across the country in the last 10 years, yet there is little evidence that these programs have created sustainable market transformation. Exhibit 7-1 presents an overview of RNC programs in California and nationwide.

- The ComfortWise™ Third-Party Initiative (TPI) Program by ConSol for SoCalGas, SCE, and SDG&E includes the following primary strategies:
  - The ENERGY STAR® Homes Program, with its rating and leveraged promotional effort.
  - The Association of Real Estate Appraisers has agreed that homes qualified by ENERGY STAR® and ComfortWise™ energy ratings may have their energy efficiency improvements included in the home appraisal.
  - Promotion and linking for Energy Efficient Mortgages (EEMs), whereby the consumer can achieve positive cash flow financing and/or the additional costs of the improvements added to the mortgage without changing the qualification requirements of the homebuyer. This linking is done so that all EEM documentation is provided directly to the builder.
  - HVAC system layout and design is required to be conducted by licensed engineer or contractor;
  - Third party inspections are required of the installation of all energy efficiency features and diagnostics of the HVAC system, including duct blaster, flow hood measurement of register air flows and measurement of system static pressure along with envelope air-tightness. (Visual inspections of envelope measures alone have been found to increase energy savings by 5-7%.[5])

- Current efforts by California UDCs generally follow the perspective of the California Board for Energy Efficiency's (CBEE) planned RNC programs. These are structured closely to the CBEE's plans in the ongoing programs for PG&E and SCE. These include:
  1. Targeted Consumer Protection & Information (including ENERGY STAR®)
  2. Infrastructure & Product Development
  3. Integrated ENERGY STAR® Showcase Homes
  4. Capability Development (Training Resource Guide)
  5. Market Leader Incentives
  6. Manufactured Housing

[5] ComfortWise™ TPI Proposal by ConSol

- There are five statewide initiatives related to the RNC market and these initiatives follow closely those recommended by the CBEE Advice Filing. These are:
  - Statewide Builder Sales Training
  - Statewide Window & Duct Training
  - Statewide Builder Resource Guide Book
  - Statewide Manufactured Housing Study
  - Statewide CHEERS audit (home energy rating system) support

- Many newly developed RNC programs in the US are linked to the US EPA ENERGY STAR® New Home initiative, which markets ENERGY STAR® branding and encourages partnering and the building of ENERGY STAR® Homes. This can allow a larger branding effort (to include marketing across appliances and homes of ENERGY STAR® brand) at a national level to be leveraged for local program efforts. The ENERGY STAR® program has signed up 492 ENERGY STAR® builders from the fall of 1995 through 1997 and completed 2,000 ENERGY STAR® homes.[6]

- California's statewide energy rating effort, CHEERS, is linked to the ComfortWise™ Program and several of the residential whole-building efforts in California (other RNC programs, retrofit efforts, and EEM efforts).

- All of the major California utilities have previously operated programs for this market. Further information on these programs is provided in Exhibit 7-1.[7]

- There have been many utility-sponsored RNC programs in the last 10 years. (Nonetheless, the number of these programs has declined in recent years as utilities reduce expenditures given the restructuring initiatives.) Several of these were some form of Good Cents or Super Good Cents programs. These programs were based upon a packaged program marketed by Southern Company. Recent results from two of these, Citizens Utilities in Arizona and Georgia Power's program, are also presented in Exhibit 7-1.

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[6] "The Market Value of Energy Efficiency: What Have We Learned? What Do We Still Need to Learn?" by Lee et. al., *1998 ACEEE Summer Study*, pp. 2.103-2.113.

[7] ComfortWise™ was also proposed by ConSol to PG&E. PG&E decided not to accept this TPI proposal given how close the proposed program was to its own RNC program, Comfort Home. Recognize, that the TPI process was conducted independently and simultaneously by the 4 utilities (PG&E, SCG, SCE, and SDG&E).

Exhibit 7-2
Residential New Construction Market Assessment
Identification of Market Barriers

Selected Market Participants	Market Barriers										
	Split Incentives	Performance Uncertainties/ Perf. search costs	Market Uncertainties/ Mrkt search costs	Organ. Practices	Focus too narrow	Hassle/Transaction costs	Low perception of value to cost	Asymmetric Information/ Opportunism	Bounded rationality	Unavailability	Access to financing
Builders	●	●	●	●	●	●				●	●
Customers (Homebuyers)		●					●	●	●	●	●
Subcontractors	●	●	●	●	●						

KEY
● High
● Moderate
● Low

Note: Assessing Importance for Market Barriers, Relevance and Potential Effectiveness for Intervention Strategies and Programs

Exhibit 7-2, Continued
Residential New Construction Market Assessment
Identification of Market Barriers

Selected Market Participants	Market Barriers										
	Split Incentives	Performance Uncertainties/ Perf. search costs	Market Uncertainties/ Mrkt search costs	Organ. Practices	Focus too narrow	Hassle/Transaction costs	Low perception of value to cost	Asymmetric Information/ Opportunism	Bounded rationality	Unavailability	Access to financing
Appraisers		●									
			●								
				●							
					●						
						●					
Code enforcement		●									
				●							
					●						
Realtors/Sales agents	●										
			●								
				●							
							●				
											●
Lenders		●									
			●								
				●							
					●						
						●					
							●				
										●	

KEY

● High
● Moderate
● Low

Note: Assessing Importance for Market Barriers, Relevance and Potential Effectiveness for Intervention Strategies and Programs

7.3 RESIDENTIAL NEW CONSTRUCTION PROGRAM ¾ MARKET BARRIERS

The RNC market is complex, with many market participants and numerous market barriers. The barriers associated with each market participant are presented in Exhibit 7-2. An important barrier in the RNC market for *Builders* is *Split Incentives.* Descriptions of each barrier are presented below.

- The analysis in this assessment focuses on selected market participants that are generally those who have the greatest influence on the adoption of energy efficient new homes and those who face the most significant market barriers. Following this paragraph is a list of market participants as found in a previous market assessment in California.[8,9]
  - Builders*
  - Customer (Homebuyer)*
  - Realtor / Builders' sales agents *
  - Lender*
  - Subcontractor*
    - .. HVAC subcontractor
    - .. Insulation subcontractor
    - .. Water heater subcontractor / plumber
    - .. Landscape subcontractor
    - .. Title 24 consultant
  - Distributors
    - .. HVAC system distributor
    - .. Duct work distributor
    - .. Window distributor / manufacturer
    - .. Insulation distributor
    - .. Gas water heater distributor
    - .. Gas range distributor
    - .. Other appliance distributors#
    - .. Nursery
  - Manufacturers
    - .. HVAC manufacturer
    - .. Duct work manufacturer
    - .. Insulation manufacturer

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[8] "Measuring Market Transformation: First You Need A Story…" by Herman et. al., *1997 Energy Program Evaluation Conference*, pp. 319-326.

[9] Those groups being examined here are highlighted with an asterisk (*). Those market participants examined here but not in this previous study are annotated by a pound sign (#).

.. Gas water heater manufacturer
.. Gas range manufacturer
.. Other appliance manufacturer#
.. Evaporative cooler manufacturers and distributors#

- Code enforcement#
- Appraisers# (Not as directly involved with new construction, but their influence on value in the overall housing market is important to the RNC market.)

- One of the major market barriers for several key supply actors in the RNC market is split incentives. The customer saves money on operating costs given an up-front investment. Yet, maximizing the number of sales often involves no incentive for builders, subcontractors, and realtors to increase energy efficiency investments. If the incremental cost were low and demand was quite high, then additional profitability might be available to these actors to sell energy efficiency. However, this is not the case and the additional hassle (of finding out about and selling high efficiency) is not worth any small increment currently possible on profit.

- Market uncertainties play a large role for builders, subcontractors, realtors, appraisers, and lenders. This is a developing market, and so they face increased information and search costs. In addition, capital costs increase for both builders and subcontractors.

- Many of the high efficiency equipment and practices are less familiar than standard equipment, which creates performance uncertainties. This is a significant market barrier for builders, end users, subcontractors, code enforcement, lenders, and appraisers. Builders and subcontractors may have significant concerns about liability and the potential for call-backs.

- Builders, subcontractors (and their supply chains), sales agents / realtors, lenders, code enforcement, and appraisers all deal with relatively complicated sales; numerous parties are involved, often in highly competitive or budget restricted circumstances. Organizational practices have developed to simplify these processes and reduce risks. Adding new elements to these sales / operations will prompt organization practice barriers for each of these market actors.

- The way a piece of equipment or practice is viewed is often within a perspective that has developed as part of organizational practices. This can present market barriers for the most efficient system operation, as the focus is too narrow (lack of a system perspective). This can be a market barrier for all the market actors in the supply chain. For example, orientation and efficient day-lighting options should be viewed along with proper HVAC distribution system design and ducting that can allow smaller sizing of the HVAC system. If each of these components is decided upon separately because separate subcontractors are hired and they do not work cooperatively, the system might be very inefficient, because each component is designed to minimize the call-back risk to each subcontractor, rather than to maximize system efficiency.

- In a system as complicated and with as many market actors as new construction, examining even small changes in practice or a system view can easily involve hassle and transaction costs until the new way of doing business is efficient and well established. This means there is an initial hurdle barrier dealing with transaction costs for builders, lenders, and appraisers.

- Consumers and realtors often do not consider energy efficiency valuable when compared to its added cost. Some of this perception stems from the fact that these market participants often have an a-priori view that all new homes are energy efficient. Though this may be quite true compared to older homes, there are still significant potential differences in the efficiency of new homes.

- In a sales environment, especially concerning such a large purchase for consumers, it is easy for the consumer to be concerned about being sold something that does not actually hold the value promised. This is due to the asymmetric information that builders and sales agents have, compared to consumers, and consumers' fear that this will be used in an opportunistic fashion against them.

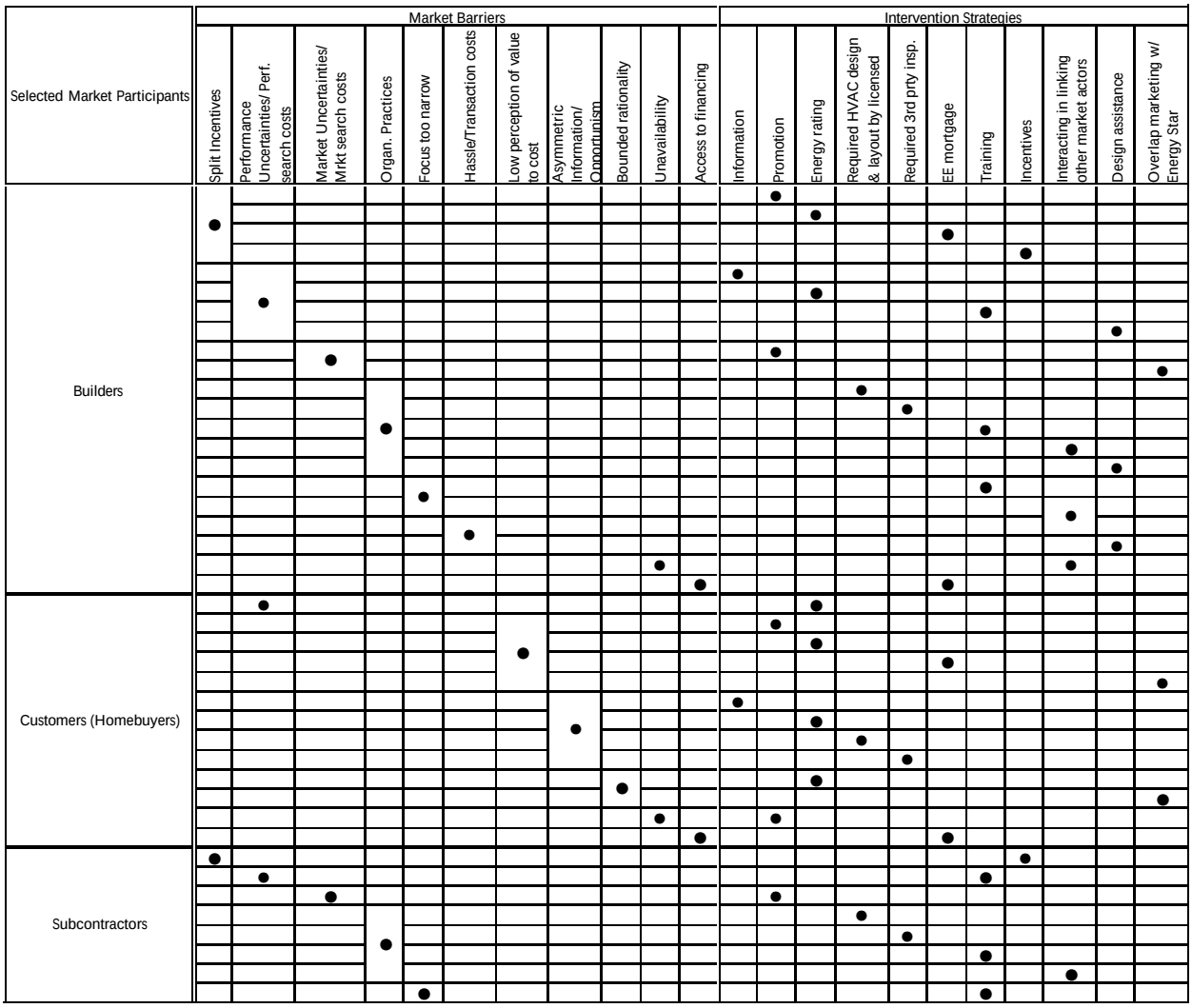
- The home-buying decision includes almost an infinite number of possible considerations. In order for this process to be manageable, consumers limit their decisions, and sometimes this means they are missing options they would select if they had fully considered it (bounded rationality). This is a common market barrier in home sales, and particularly in the new home market where decisions (choices) abound.

- Because high efficiency practices and equipment are so poorly accepted in this market, many of the most efficient equipment and practices appear unavailable to the builders and consumers. This is particularly true of less standard options, such as evaporative cooling or non-condenser cooling options.

- Besides the above, unavailability of lenders can stem from a very low awareness of energy efficient mortgages (EEM) and the very immature nature of a secondary market for EEMs.

- Access to financing can assist in reducing split incentives for builders and realtors, allowing the possibility for these types of sales to be profitable for these market actors. Similarly, positive cash flow financing can similarly allow homebuyers to select efficient options without having to give up other desired options. Though EEMs are an intervention strategy, lack of awareness is a market barrier to accessing financing.

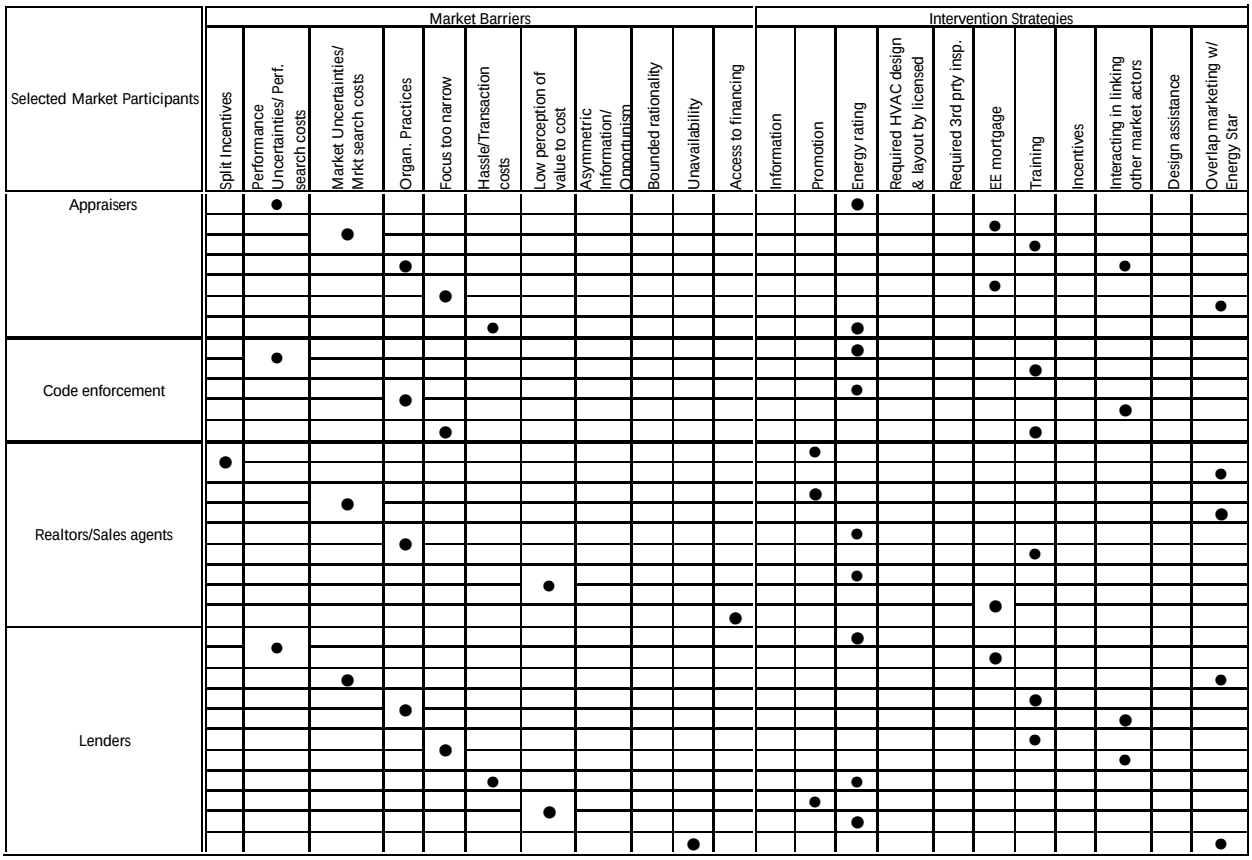
Exhibit 7-3
Residential New Construction Market Assessment
Assessing the Potential Effectiveness of Intervention Strategies



KEY
- ● High
- ● Moderate
- ● Low

Note: Assessing Importance for Market Barriers, Relevance and Potential Effectiveness for Intervention Strategies and Programs

Exhibit 7-3, Continued
Residential New Construction Market Assessment
Assessing the Potential Effectiveness of Intervention Strategies



KEY
- ● High
- ● Moderate
- ● Low

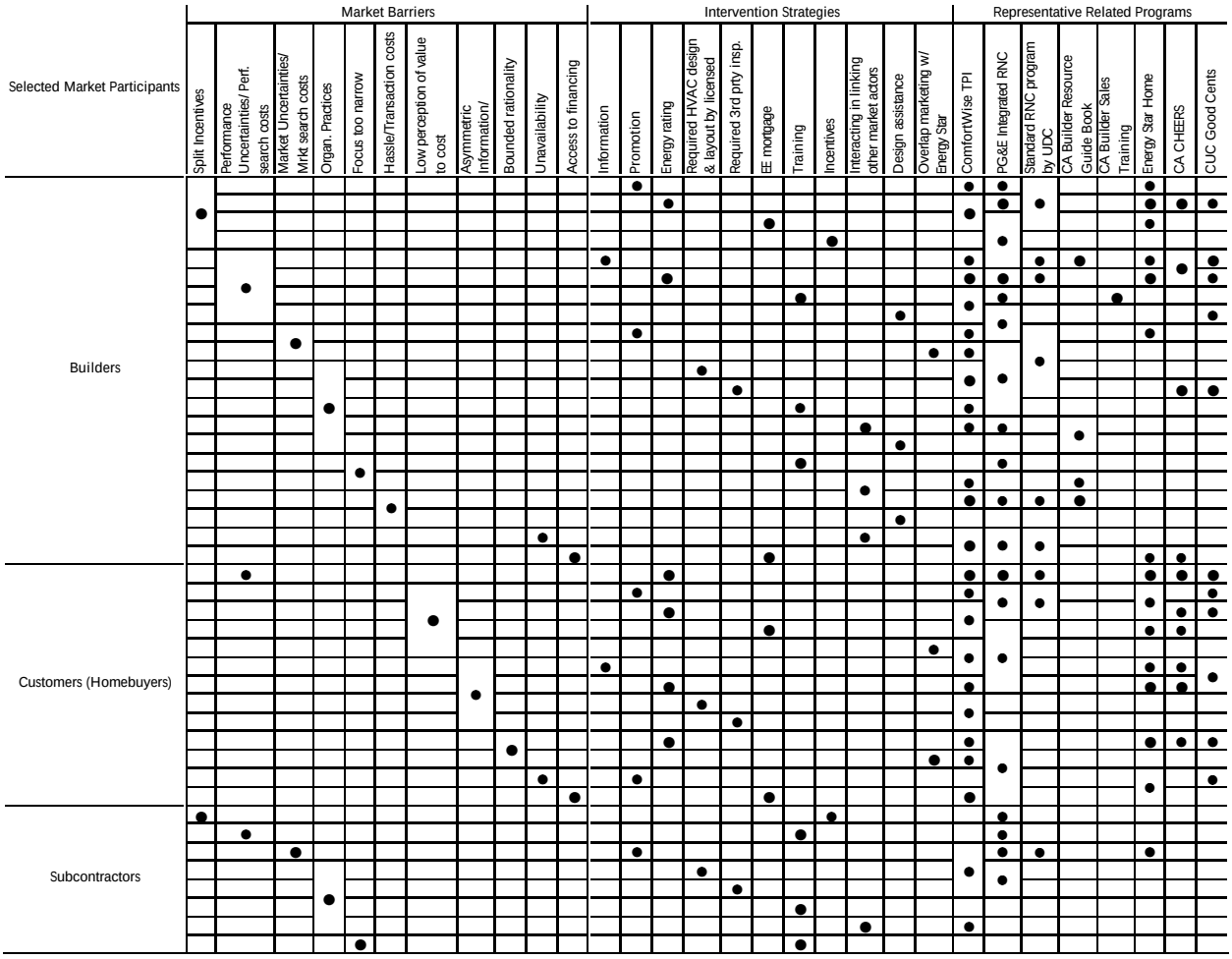
Note: Assessing Importance for Market Barriers, Relevance and Potential Effectiveness for Intervention Strategies and Programs

7.4 RESIDENTIAL NEW CONSTRUCTION PROGRAM ¾ INTERVENTION STRATEGIES

Because the market is so complex, with many market barriers and participants, many intervention strategies are warranted. Exhibit 7-3 provides a picture of how each intervention strategy maps to each market barrier, for each participant. For example, an important market barrier for *Builders* is *Split Incentives*, which can be reduced through a number of intervention strategies including *Promotion, Energy Rating, EE Mortgage, and Incentives*. Descriptions of the intervention strategies, and how they address the market barriers, are presented below.

- Many intervention strategies have been attempted at a variety of levels of effort by prior RNC programs. Given the lack of market transformation, these intervention strategies may need to be re-examined and improved through more detailed program and implementation theory. These could include:
  - Refining design to better target the market barrier(s);
  - Working more closely with the relevant market participants to ensure the strategy moves the changes it is trying to accomplish; or
  - Operating in a more focused fashion on a niche-by-niche basis in order to tailor the intervention for effective implementation.
- The ComfortWise™ Program offers several key intervention strategies in the areas of financing and profitability for builders, direct assistance in linking market actors, legitimacy through CHEERS energy ratings, and required organizational practices with regard to HVAC design, operation, and inspections. So to some extent it addresses a number of market barriers. Yet, the size of the program and its focus limits the effectiveness of the breadth of market barriers it can address. (e.g., it does not directly address any of the barriers faced by code enforcers or appraisers. It also has a small consumer promotional effort, resulting in limited effects for consumers' barriers.)

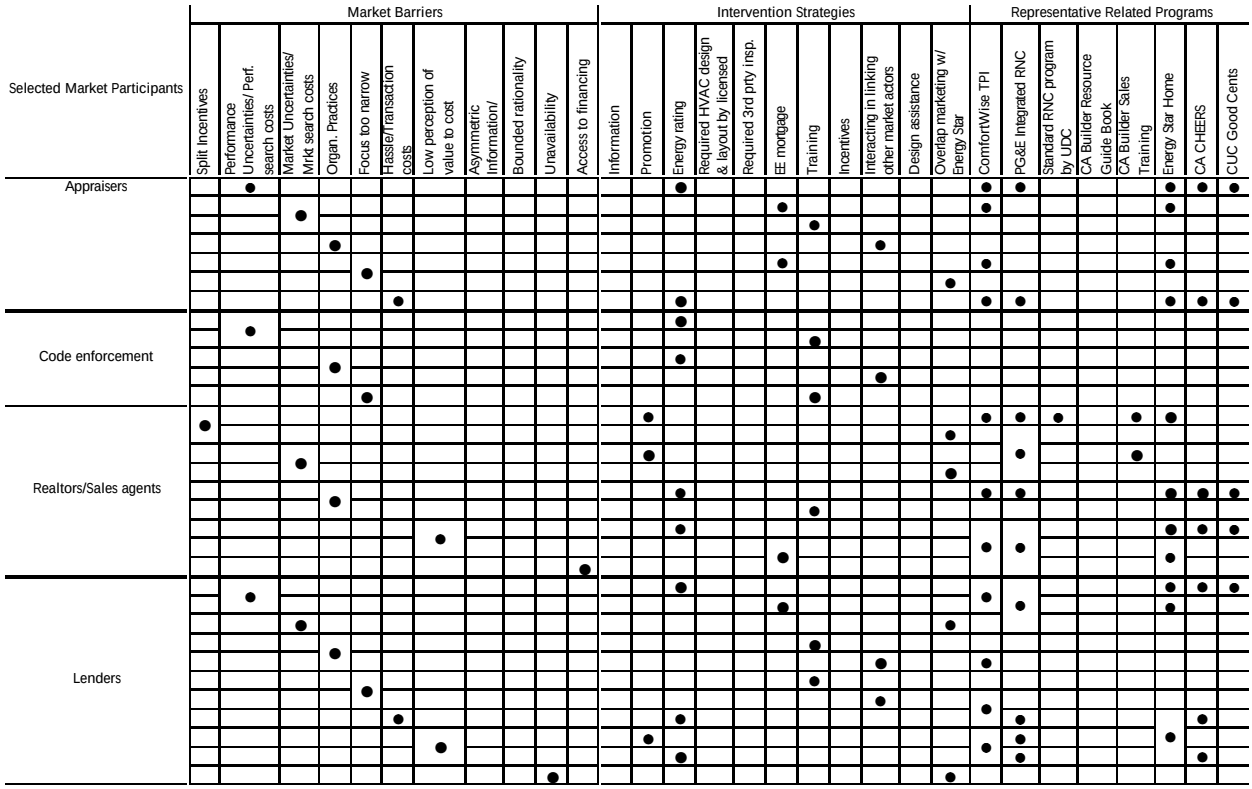
Exhibit 7-4
Residential New Construction Market Assessment
Identification of Program Targets



KEY
- High
- Moderate
- Low

Note: Assessing Importance for Market Barriers, Relevance and Potential Effectiveness for Intervention Strategies and Programs

Exhibit 7-4, Continued
Residential New Construction Market Assessment
Identification of Program Targets



KEY
- ● High
- ● Moderate
- ● Low

Note: Assessing Importance for Market Barriers, Relevance and Potential Effectiveness for Intervention Strategies and Programs

7.5 RESIDENTIAL NEW CONSTRUCTION ¾ ASSESSMENT OF POTENTIAL EFFECTIVENESS

The ComfortWise™ Program is a small program that appears to be using a narrow focus on market actors to achieve greater depth than other RNC programs. Other RNC programs in California are spending 2,000% more, yet historically RNC programs have not accomplished market transformation. Of course, traditional RNC programs were designed as resource acquisition programs that cpatured what would otherwise have been lost opportunities in this market. They were successful (though only marginally cost-effective) in meeting this goal. However, studies of their long-term market effects show little impact, with the possible exception of easing the introduction of tighter energy use standards for new construction.

If the variation in the ComfortWise™ approach proves to initiate market transformation, this potential should be re-assessed to use the lessons learned from this program in the overall California RNC effort. Exhibit 7-4 describes how the TPI program and related programs are effective, or ineffective, in reducing market barriers. For example, the *ComfortWise*Ô and *PG&E Integrated RNC* programs, through *Promotion,* were somewhat effective in reducing *Split Incentives* for *Builders*. The ability of the TPI and other related programs to successfully reduce market barriers is addressed below.

- The ComfortWise™ Program is a small program in a market that has had numerous utility programs in operation around the country. Though ComfortWise™ has used its unique approach elsewhere in California and Nevada, it is still relatively innovative when compared to the massive RNC efforts previously undertaken by US utilities. Its more unique features include:
  - A focus on making selling energy efficient homes profitable for builders by combining energy efficiency mortgages, rating, and promotion;
  - A focus on simplifying what considerations are made (items / packages for meeting program efficiency levels) and concentrating on a smaller effort; and
  - A focus on working more closely and at a greater depth with all the market players involved in the market. An example of this is working with specific window manufacturers to initiate a plant development in Southern California, to help ensure product availability for "hack-outs" (replacements for breakage during construction).

- As shown Exhibit 7-4, most of the barriers have been addressed in some shape or form. Some programs, like PG&E's Integrated RNC Program, touch all market participants, but concentrate on the builder and homebuyer sector. Others, like the Standard RNC Program, primarily address builders and homebuyers, although not very effectively.

- The ENERGY STAR® Home and California CHEERS Programs focused their efforts broadly as well, but were most effective with builders and homebuyers.

7.6 RESIDENTIAL NEW CONSTRUCTION ¾ IMPPLEMENTATION EFFECTIVENESS

The ComfortWise™ project received more favorable reviews from the UDC managers than any other TPI project. The project was so successful in getting builders to commit and follow through on increasing energy efficiency that the project met its quota early on, and had to request additional resources to satisfy the backlog. Project managers raved at how prepared the ConSol team was, and how little management time was required for the project's success. This may have to do with the fact that ComfortWise™ has been a viable business. In all, ComfortWise™ was the model project for a hands-off project like TPI.

7.7 RESIDENTIAL NEW CONSTRUCTION ¾ POTENTIAL FOR SUSTAINABILITY

The fact that the projects like ComfortWise™ are operating elsewhere in California and Nevada in a sustainable way provides some evidence of this program's potential for sustainability. The focus of this project is narrow and specific, and currently it is not clear whether these efforts can be applied more broadly with similar success.

- Historically, RNC programs have not accomplished market transformation. If the variation in the ComfortWise™ approach proves to initiate market transformation, then this potential should be re-assessed for the purpose of modifying the overall RNC effort in California.

- If ComfortWise™ can continue to gain the confidence of builders, and to exact changes from suppliers, the project's success will likely increase. Homebuyers, the other important market actor category, still have a significant perceived low value to cost ratio barrier to overcome. Until this barrier can be reduced it is unlikely that we will see significant market effects in the RNC market.

- ComfortWise™ has been described as a successful program by all project managers. ConSol was able to follow their proposal to the letter, and in the end was so successful that they completed their obligation before the end of the contractual period while most other program sponsors were seeking extensions.

7.8 RESIDENTIAL NEW CONSTRUCTION ¾ SUMMARY

The ComfortWise™ was a model for success and professionalism. No other project received as much praise from program managers. The narrow focus of the project may have contributed to its ability to succeed. Whether it will have similar success when expanded is not known, although promising.

8. ENERGY-EFFICIENT MORTGAGE PROGRAM

8.1 ENERGY-EFFICIENT MORTGAGE PROGRAM ¾ OVERVIEW AND TECHNICAL POTENTIAL

Energy-efficient mortgages (EEMs) have been available for a number of years, but have yet to become a significant influence in the market, the Energy-Aware Housing Agent (EAHA) program seeks to increase awareness of these mortgages within a small niche market, foreclosed HUD homes.

8.1.1 Program Overview

The EAHA program is designed to increase the number of energy efficient mortgages, in the PG&E service territory. The program offerings training in EEM implementation to lenders and realtors, which then gives attendees access to the pool of HUD homes. Energy efficient mortgages (EEMs) have been available since the 1980s with EEMs available through HUD in all 50 states since 1995.[1] The source for EEMs is the EPAct92, which mandated issuance of voluntary national energy rating guidelines and more liberal FHA loan guaranty and underwriting standards for EEMs.[2] In 1992, Congress approved changes for FHA and the VA for removing additional cash down payments and including automatic approval of cost-effective energy upgrades as part of their EEM processes. The FHA 203(k) rehab loan with an EEM also carries the same incentives as an FHA EEM.

Previous efforts to increase the saturation of EE mortgages have meet with limited success in spite of increasing pools of qualified agents. In interviews with lenders, most found EE mortgages a hassle to be avoided unless opportunities in more traditional mortgages markets began to decline. By offering a carrot, in the form of access to HUD homes, the EAHA program provides an incentive to carry out EE mortgages.

- Only 50,000 EEMs have been undertaken in the 16 years of 1979-1995. However, in 1995 California EEMs (860) were 50 percent of the national total[3] (still, a small percentage of loans). In 1995, there were 69,184 FHA loans and only 740 FHA EEMs in California, just over one percent.[4]

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[1] "Linking Home Energy Rating Systems with Energy-Efficiency Financing: National and State Programs" by Collins et. al., *1996 ACEEE Summer Study*, pp. 2.35-2.46.

[2] "Making the American Dream More Affordable Through Energy Efficiency Financing" by Malcom Verdict, *1996 ACEEE Summer Study*, pp. 2.215-2.219.

[3] Ibid.

[4] "Linking Home Energy Rating Systems with Energy-Efficiency Financing: National and State Programs" by Collins et. al., *1996 ACEEE Summer Study*, pp. 2.35-2.46.

- There is basic economic support for creating a market for EEMs. A review of several academic studies found that energy efficiency does increase property values. On average there is an increase of $20-$24 in property value for every $1 reduction in the annual fuel bill.[5] This fact is important for the long-run sustainability of both an EEM market and an energy rating market.

8.1.2 Program's Technical Potential

- Homes in California's Central Valley (one of the areas targeted by the TPI program) are estimated to be able to save up to 2,500 kWh (30 percent of usage) and 440 therms (40 percent of usage) for the installation of energy efficiency measures through EEMs (though these figures may be high due to constraints posed by FHA-financing limits). This would provide customers with $600 savings in utility bills annually.[6]

[5] "The Market Value of Energy Efficiency: What Have We Learned? What Do We Still Need to Learn?" by Lee et. al., *1998 ACEEE Summer Study*, pp. 2.103-2.113.

[6] Energy-Aware Housing Agent Program, TPI Proposal by Staples-Hutchinson and Associates for Pacific Gas and Electric Company.

Exhibit 8-1
Energy Efficient Mortgage Market Assessment
Related Program Identification

Program	Description	Utility Sponsors				Funding ($000)*	Sources
		SCE	SoCalGas	PG&E	SDG&E		
TPI Programs							
EE Mortgages	Provides training for HUD sales agents, lenders, and realtors for EE mortgages associated with HUD home sales, which will all have CHEERS ratings.			●		500	1998 TPI Proposal
Ongoing and Planned California Programs							
Statewide CHEERS	Non-profit initiated CHEERS system, CHEERS web site promotes EEM, Links to HUD sales & TPI program	●	●	●	●	Statewide PG&E: 128, SCE: 375, SCG: 200, SDGE: 150	PG&E 1999 Advice Filing, 1999 SCE Advice Filing, 1999 SCG Advice Filing
CBEE Recommended Programs: 1. Analysis, Training, and Education in Energy Efficient Mortgage Lending 2. Preferential Energy-Efficient Mortgage Products for Premium Efficiency Homes	1. Increases institutionalization of energy efficient mortgages and full accounting for efficiency in valuation, and will remove institutional financial barriers to rational investment in new home energy. 2. Increases market demand for energy efficient homes by creating additional demand at the leading edge of the market.						CBEE Advice Filing
Previous Utility Initiatives							
SCE Residential Financing Program	Subsidizes interest rate for cooperative program with Countrywide Funding Corporation linked to CHEERS program, loans for ee investments from $1,000 to $10,000. Targeted to inland desert climates.	●				3,000	1998 SCE Advice Filing
PG&E Comfort Link	Below market loans for residential energy efficiency.			●			Mowris Report
SCE Welcome Home Program	Residential new construction program that included EEM lending org. promotion, & HERS rating	●				1000 (Only small part EEM promotion)	1998 SCE Advice Filing
SCG Energy Advantage Home 1994-1998 (High Efficiency New Home Program 1990-1993)	Residential new construction program that included EEM lending org. promotion, & CHEERS rating		●				Residential Market Effects Study by RER
Statewide CHEERS	Non-profit initiated CHEERS system	●	●	●	●	Statewide PG&E: 170, SCE: 250, SCG: 200	PG&E 1998 Advice Filing, 1998 SCE Advice Filing, 1999 SCG Advice Filing
Related Programs (e.g., National efforts)							
Energy Star New Home	Marketing and establishing EEM process as part of marketing US EPA new home rating program, trying to become national standardized program promoted by all utilities, includes Builder Training material for what practices and materials help meet Energy Star performance, some national marketing and concentrated regional marketing						Energy Star Home Page
PRIME, Provincial program of Quebec	Energy rating, financial products, audits & other environmental services as selected by local non-profits performing the audits (program is on hold due to politics, finance and differences with federal rating initiative)						Article in 1998 ACEEE Summer Study Proceedings by Dunsky
MA RNC programs & Builders Guide	Includes promotion of ee mortgages, MA RNC electric utility program fuel blind, All programs (electric & gas) linking to Energy Star, Demonstrations, Advertising, Developing new Builders Guide						Boston Gas Residential new Construction Market Assessment &

8.2 ENERGY-EFFICIENT MORTGAGE PROGRAM — RELATED PROGRAMS

There are many rating programs and programs with some elements of EEM promotion, but few focused EEM programs. The Third-Party Initiative (TPI) EAHA program is designed to work cooperatively with HUD, providing an EEM training and marketing effort in conjunction with HUD's Home Sales program (for the sale of HUD owned homes due to foreclosures). Exhibit 8-1 presents an overview of the RNC programs in California, and nationwide.

- The primary initiatives of the EAHA program include:
  - Training and marketing to HUD sales agents, realtors, and mortgage lenders.
  - Marketing to homebuyers (at HUD Home Shows and point of sale displays in HUD Fresno and San Francisco regions, public service announcement, newspaper advertisements).
  - HUD web site augmentation.
  - $300 incentive to realtors for EEM generation.

- Some of the HUD regions in the EAHA program area are offering incentives to lenders for the completion of EEMs with HUD properties.

- Many residential new construction programs have included some component of EEM marketing in the past. However, these efforts were generally minimal and not well focused as the EAHA program.

- California's statewide energy rating effort, CHEERS, promotes EEMs on their web page, and includes rating information and links to HUD sales and this TPI program.

- Pacific Gas & Electric and Southern California Edison have both previously offered subsidized financing for energy efficiency improvements.

- The USEPA Energy Star New Home initiative has a component of promoting EEMs and the infrastructure to support them. The Energy Star program has signed up 492 Energy Star builders from the fall of 1995 through 1997 and completed 2,000 Energy Star homes.[7]

- The Ministry of Natural Resources in the Province of Quebec initiated a comprehensive residential energy efficiency effort, PRIME, that incorporated the development of EEMs (as well as other financing and program elements). Recent changes in federal policy in Canada as well as political difficulties has led to the PRIME effort being placed on indefinite hold.[8]

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[7] "The Market Value of Energy Efficiency: What Have We Learned? What Do We Still Need to Learn?" by Lee et. al., *1998 ACEEE Summer Study*, pp. 2.103-2.113.

[8] "Residential DSM Programme Development and Implementation: Lessons from 'PRIME'" by Philippe Dunsky, *1998 ACEEE Summer Study*, pp. 5.61-5.72.

Exhibit 8-2
Energy Efficient Mortgage Market Assessment
Identification of Market Barriers

Market Participants	Market Barriers							
	Performance/ Market Uncertainties	Split Incentives	Info/Search Costs	Hassle/Transaction Costs	Asymetric Information	Bounded rationality	Organ. Practices	Unavailability/ Access to financing
Builders	●							
			●					
							●	
Customers (Homebuyers)	●							
			●					
					●			
Realtors/Sales agents	●							
			●					
				●				
							●	
Lenders		●						
	●							
			●					
				●				
							●	

KEY

● High

● Moderate

● Low

Note: Assessing Importance for Market Barriers, Relevance and Potential Effectiveness for Intervention Strategies and Programs

8.3 ENERGY-EFFICIENT MORTGAGE PROGRAM ¾ MARKET BARRIERS

The barriers associated with each market participant are presented in Exhibit 8-2.[9] This analysis is based upon a thorough review of secondary data sources described in Section 8.2, interviews with the project managers, sponsors and lenders.

- Generally, there is very little awareness and, therefore, little experience with EEMs. Due to this, there are also very few organizational practices designed to address EEMs. Many significant market barriers arise as a result of this immaturity in the EEM market.
  - Lenders, sales agents/realtors, and builders all deal with relatively complicated sales with numerous parties involved. Organizational practices have developed to simplify these processes and reduce risks. Adding new elements to these sales (e.g., energy efficiency and EEMs) runs into organization practice barriers for each of these market actors. The greatest fears are that EEMs will complicate or delay the sale and little demand is seen (market uncertainties).
  - The immaturity of the EEM market also means that the availability of EEMs is not recognized. Most market actors know little about them or where to get information, or even why they need to be considered (low perception of value).

- As in many other areas of efficiency and home sales, the market actors generally have split incentives. The benefits of efficiency (and EEMs) go to the consumer while immediate costs (and market risk) are seen by lenders.

- Consumers (homebuyers) also face information costs and low perception of value along with the unavailability of EEMs.

- The home buying decision includes almost an infinite number of possible considerations. In order for this process to be manageable, consumers limit their decisions, and sometimes this means they are missing options they would select if they had fully considered it (bounded rationality). This is a common market barrier in home sales and is definitely applicable to adding another element into the home buying decision, an EEM.

[9] Section 4.1 presents a detailed discussion of the market assessment method.

Exhibit 8-3
Energy Efficient Mortgage Market Assessment
Assessing the Potential Effectiveness of Intervention Strategies

Market Participants	Market Barriers								Intervention Strategies			
	Performance/ Market Uncertainties	Split Incentives	Info/Search Costs	Hassle/Transaction Costs	Asymetric Information	Bounded rationality	Organ. Practices	Unavailability/ Access to financing	EE mortgage	Overlap with energy rating	Marketing of EEM	Incentives
Builders	●								●	●	●	
			●									
							●					
Customers (Homebuyers)	●								●	●	●	
			●							●		●
					●				●			
Realtors/Sales agents	●								●	●		●
			●							●	●	●
				●							●	●
							●					
Lenders		●										
	●								●	●	●	
			●									
				●								
							●			●	●	

KEY
● High
● Moderate
● Low

Note: Assessing Importance for Market Barriers, Relevance and Potential Effectiveness for Intervention Strategies and Programs

8.4 ENERGY-EFFICIENT MORTGAGE PROGRAM ¾ INTERVENTION STRATEGIES

Intervention strategies include training, overlap with energy rating, marketing, and incentives for lenders and sales agents closing EEMs. Exhibit 8-3 provides a picture of how each intervention strategy maps to each market barrier. For example, an important market barrier for *Builders* is *Market Uncertainties*, which can potentially be reduced through *EE Mortgage*, *Overlap with Energy Rating* and *Marketing of EEM*. Descriptions of the intervention strategies, and how they address the market barriers, are presented below.

- Training efforts and coordination with energy rating efforts have the potential to reduce multiple market barriers for lenders, builders (for EEMs in the new construction market), and sales agents / realtors.
  - Training can provide new ways to look at the benefits of EEMs, so that organizational practice barriers are reduced. Similarly, hassle / transaction costs can be reduced by establishing how the EEM process can be completed simply.
  - As more market actors are trained in working with EEMs, the availability of EEMs can increase.
  - Part of the training includes imparting information and detail concerning the benefits and costs of providing EEMs.

- Overlapping EEM market development with energy rating efforts can address numerous information searches, credibility, and ease in making organizational practice adjustments for EEM promotion by market actors.

- Besides providing information, promotional activities help develop the market, making EEMs more available, valuable, and reducing market uncertainties for upstream market actors.

- Incentives are used to provide a short-term method to address split incentives. These are expected to be reduced as the market matures and increased demand for EEMs collapses the price gap.

- The EAHA program TPI program offers all four of these intervention strategies, addressing a number of market barriers to some extent. However, the size of the program and its niche market limits the effectiveness and breadth of market barriers it addresses. For example, it does not address any of the barriers to builders. It is also a very small consumer promotional effort and its market effects study found no real effects among consumers.

Exhibit 8-4
Energy Efficient Mortgage Assessment
Identification of Program Targets

Market Participants	Market Barriers								Intervention Strategies				Related Programs				
	Performance/ Market Uncertainties	Split Incentives	Info/Search Costs	Hassle/Transaction Costs	Asymetric Information	Bounded rationality	Organ. Practices	Unavailability/ Access to financing	EE mortgage	Overlap with energy rating	Marketing of EEM	Incentives	Energy-Aware Housing Agent Program TPI	CHEERS	Energy Star New Home	Prior CA Utility programs	MA Energy Star Homes asst. Builder Guide
Builders	●								●	●	●			●	●		
			●										●	●		●	●
							●								●		
Customers (Homebuyers)	●								●	●			●	●	●		
			●								●	●		●		●	●
					●				●	●			●	●	●		
Realtors/Sales agents	●								●	●		●	●	●	●		
			●								●	●	●	●	●		
				●						●							
							●				●	●	●				
Lenders		●											●		●		
	●								●		●			●			
			●							●			●		●		
				●													
							●			●	●		●	●	●		

KEY

● High

● Moderate

● Low

Note: Assessing Importance for Market Barriers, Relevance and Potential Effectiveness for Intervention Strategies and Programs

8.5 ENERGY-AWARE HOUSING AGENT PROGRAM ¾ ASSESSMENT OF POTENTIAL EFFECTIVENESS

The Energy-Aware Housing Agent program is attempting to reduce market barriers in specific geographic areas for a niche market, HUD home sales. The program is a focused EEM effort with significant cooperation from the HUD regional offices, making it innovative and with significant potential for expanded similar efforts in other niches and the broader market. However, given its current small niche status, it is not expected to create sustainable market transformation in the overall potential EEM market. Exhibit 8-4 describes the key features of the TPI program, and related programs, to allow for an assessment of the synergies offered among programs.

are effective (or ineffective) in reducing market barriers. For example, the *CHEERS program*, through its *Marketing of EEM*, was relatively effective in reducing *Market Uncertainties* for builders. The ability of the TPI and related programs to successfully reduce market barriers is addressed below.

Exhibit 5-4 summarizes the key features of the TPI Duct Efficiency Program in terms of both the intervention strategies offered by the program to address targeted market effects barriers and the potential effectiveness of the TPI program elements. Key features of related program programs are also presented to allow an assessment of the synergies (and possible overlaps) among programs, and to identify areas where the TPI program has the potential to target needs not addressed elsewhere. Key observations are presented below.

- The Energy-Aware Housing Agent Program (EAHA program) is a relatively small program targeted to a niche market. (The HUD sales market is approximately five to seven percent of the statewide home market. HUD sales, however, are 30 percent of the home sales market in the Central Valley.)

- A well-focused program aimed at a niche market may be an excellent way to start market transformation, especially in a market that had not been moving forward previously. Yet, it is not expected to have large market effects in the overall housing market or to have sustainable effects.

8.6 ENERGY-AWARE HOUSING AGENT PROGRAM — IMPLEMENTATION EFFECTIVENESS

According to the project manager and the final report the program was successful in training lenders and realtors to promote and implement EEMs. In all, the project completed 21 real estate agent training sessions and 11 mortgage broker training sessions. The number of EEMs closed in the study region increased from 151 to 962 (537%) during the same period in the previous year. Whether the project can take credit for the entire change is unclear, however they should be credited with a majority of the increase.

The project's narrow focus on foreclosed HUD represented a departure from previous programs which focused on a wider set of homes. By using access to HUD homes as the "carrot" to implementing EEMs, the project should be judged as innovative and successful. In addition "carrot" in the form of a $300 incentive for each closed EEMs was also a likely contributor. The program has been rolled into PG&E's 1999 energy efficiency efforts, offering some measure of project success.

8.7 ENERGY-AWARE HOUSING AGENT PROGRAM – POTENTIAL FOR SUSTAINABILITY

The EAHA program's targeted approach, as well as its close cooperation with HUD, is innovative.[10] Maintaining that same tight focus with other large holders of foreclosed properties may be a sustainable path.

- The EAHA program market effects study found that lenders and sales agents discover that their worries concerning paperwork, delay of the sale, and other difficulties are unfounded once they actual work with EEMs.

- The customers are satisfied with the EEM process. The largest barriers for creating a sustainable EEM market include the small number of lenders, sales agents, and realtors trained, and the lack of consumer awareness and demand for EEMs.[11]

8.8 ENERGY-AWARE HOUSING AGENT PROGRAM – SUMMARY

The EAHA program's targeted approach, as well as its close cooperation with HUD were a recipe for success. The program will continue to be offered as part of PG&E's energy efficiency efforts, implying a certain level of success.

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[10] It is our understanding that at the time of this report, PG&E is expanding this approach by conducting similar efforts for the niche markets of VA properties, and Department of Agriculture properties.

[11] *Energy-Aware Housing Agent Program: A Market Effects Study* by Schiller Associates under subcontract to Staples-Hutchinson and Associates for Pacific Gas and Electric Company, December 15, 1998.

9. HOME COOLING PROGRAM

9.1 HOME COOLING PROGRAM ¾ OVERVIEW AND TECHNICAL POTENTIAL

The Home Cooling Program attempts to move the evaporative cooler market forward, through a demonstration and training program.

9.1.1 Program Overview

The Third-Party Initiative (TPI) Home Cooling Program is designed to move the market for evaporative cooling through two main activities:

- implementation of six designer/installer training classes, and
- installation of up to 175 demonstration sites with builder incentives of $1,500 - $2,000 and a guarantee to replace the system in model homes if builders are unsatisfied.

The program proposal stated that the target market for PG&E's service territory in northern and central California consists of over 125,000 units per year.[1] This is a combination of new construction and replacements. The transitional climates (57% of PG&E customers have no cooling systems) are seeing an increasing proportion of new homes with cooling systems and conversions in existing homes to add cooling systems. Another estimate is that 48,000 new residential units each year in PG&E's service territory alone have the potential for some form of evaporative cooling system.[2] A Southern California Edison demonstration study estimated that 2,105 residential customers per year could replace central air conditioning (CAC) units with indirect-direct evaporative coolers in the Coachella Valley.[3]

9.1.2 Program's Technical Potential

Evaporative cooling holds significant potential for energy savings in specific areas of California.

- The Evaporative Cooling Program proposal claims that even the demonstration phase for this project will be cost-effective, with TRC measuring over 13 and the utility cost test measuring over 2.4. The proposal also cites a 75% savings in cooling operating costs when substituting evaporative cooling technologies for CAC.4

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[1] The Home Cooling Program by Davis Energy Group, Inc. and Refrigeration Technology, Inc. for Pacific Gas and Electric Company.

[2] "Evaporative Condensers: The Next Generation in Residential Air Conditioning?" by Hoeschele, et. al., *1998 ACEEE Summer Study*, pp. 1.147-1.158.

[3] "Field Measurement and Evaluation of an Indirect-DX Air Conditioning Systems" by Nicolas Puga and Henry Lau, *1994 ACEEE Summer Study*, pp. 3.205-3.215.

[4] ibid.

- Evaporative pre-coolers and immersing the AC condenser coil in an evaporatively cooled sump are already cost-effective in Fresno. They are close to being cost-effective for San Jose and Sacramento. Current incremental costs for these are $568 for the pre-cooling and $1,071 for the cooled sump, compared to $630 for a SEER 12 CAC. These costs are expected to decline with a maturing market, due to a decrease in production costs.[5]
- In a Sacramento Municipal Utility District (SMUD) study, residential indirect/direct evaporative cooling was found to have 60% savings over 10 SEER air conditioners with a cost-effective usage of 61 gallons of water per day.[6]
- A test by SCE in Palm Springs found a 21% efficiency improvement for a CAC when an evaporative pre-cooler was used for outdoor temperatures of 100°.[7]

[5] "Evaporative Condensers: The Next Generation in Residential Air Conditioning?" by Hoeschele, et. al., *1998 ACEEE Summer Study*, pp. 1.147-1.158.

[6] "Residential Indirect/Direct Evaporative Cooler Performance in Sacramento" by Marc Hoeschele, *1994 ACEEE Summer Study*, pp. 9.175-9.185.

[7] "Evaporative Condensers: The Next Generation in Residential Air Conditioning?" by Hoeschele, et. al., *1998 ACEEE Summer Study*, pp. 1.147-1.158.

Exhibit 9-1
Evaporative Cooler Market Assessment
Related Program Identification

Program	Description	Utility Sponsors				Sources
		SCE	SoCalGas	PG&E	SDG&E	
TPI Programs						
Evaporative Cooling	Improve mfr/dist/instnl infrastructure for residential evaporative coolers through training, at least 150 demonstration sites, incentives $1,500-$2,000 and building guarantee for model homes			●		1998 TPI Proposal
Ongoing and Planned California Programs						
PG&E Natural Cooling Program	Complete documentation on 5 demonstration sites (C/I) and provide seminars and papers on findings and areas of installation improvement			●		PG&E 1999 Advice Filings
PG&E, SMUD, and TPI Program (Davis Energy) working with CEC	PG&E, SMUD, and Davis Energy Group, based on their demonstration programs, are working with the California Energy Commission to develop appropriate Title 24 compliance SEER equivalents for evaporative cooling.			●		1999 PG&E Advice Filing Update
Previous Utility Initiatives						
PG&E Natural Cooling Program	Investigate natural cooling through five demonstration sites (C/I).			●		PG&E 1998 Advice Filings
SCE Evaporative Cooler Study	1993 Field measurement and evaluation of C/I usage of indirect-DX evaporative coolers, indirect solves the "too humid indoor" problem, and hotter peak day issue -- Still problems with lack of standard ratings	●				Article in 1994 ACEEE Summer Study Proceedings by Puga and Lua
SMUD Evaporative Cooler Program	Indirect/direct evaporative cooling tested 1993 at 6 Sacramento residences w/ existing AC: 60% savings over 10 SEER AC, did OK at peak 61 gallons of water/day, numerous callbacks due to contractor unfamiliarity; Installed at 50 residences					Article in 1994 ACEEE Summer Study Proceedings by Hoeschele
Related Programs (e.g., National efforts)						
ASHRAE	Efforts underway to develop standard ratings for evaporative coolers that can be compared to SEERS.					

9.2 HOME COOLING PROGRAM ¾ RELATED PROGRAMS

This is an immature market, where demonstrations and the creation of the necessary infrastructure are still being undertaken. To help foster growth in the industry, initial testing and demonstration projects are being conducted. Exhibit 9-1 presents an overview of related utility programs, past and present, as well as programs from other areas of the country.

- The PG&E Natural Cooling Program is developing 5 commercial demonstration sites. The performance at these sites is being documented, and papers and seminars on the findings will be disseminated.

- The group performing the TPI program is working with PG&E, SMUD, and the California Energy Commission (CEC) to get Title 24 compliance for these technologies (including compliance software) and a comparable SEER rating for comparison purposes.

- In 1993 Southern California Edison (SCE) conducted a field measurement and evaluation of indirect/direct evaporative cooling systems for C/I usage. The primary evaluation goal was to test whether the new evaporative cooler technology (as opposed to the earlier direct evaporative cooling) solves the problem of cooling when outdoor temperatures exceed 95°, without increasing indoor humidity. The indirect/direct systems did accomplish this. The new systems also no longer have problems with corrosion, mineral and salt deposits, and odor.

Exhibit 9-2
Evaporative Cooler Market Assessment
Identification of Market Barriers

Market Participants	Strength of Market Barriers											
	Performance/ Market Uncertainties	Organ. Practices	Info/ Search Costs	Hassle/Transaction Costs	Unavailability	Title 24	Focus too narrow	Split incentives	Asymetric information	Bounded rationality	Access to financing	Low Perception of Value to Cost
Builders	●											
		●										
			●									
				●								
					●							
						●						
							●					
								●				
									●			
Customers (Homebuyers)	●											
			●									
					●							
									●			
										●		
											●	
												●
HVAC Contractors	●											
		●										
			●									
				●								
					●							
						●						
							●					
								●				
									●			
Realtors/Sales agents	●											
												●
			●									
								●				

KEY
- ● High
- ● Moderate
- ● Low

Note: Assessing Importance for Market Barriers, Relevance and Potential Effectiveness for Intervention Strategies and Programs

9.3 HOME COOLING PROGRAM ¾ MARKET BARRIERS

The initial market barriers are primarily focused on the first step in developing a new product, product introduction. Given the infancy of the technology, the primary barriers are related to unavailability and uncertainty. For example, *Performance/Market Uncertainties* are a major market barriers for all market participants in the product introduction phase. According to the project sponsors and secondary data sources, this is exacerbated by negative perceptions of the older direct evaporative cooler technology ("swamp" coolers). The older technologies had odor and corrosion problems, new technologies and indirect technologies do not have these problems. Previous studies reveal a perception that evaporative coolers are of low quality and unable to handle high temperatures comfortably, having maintenance problems, odor problems, and presenting health issues.[8] The barriers associated with each market participant are presented in Exhibit 9-2.

- Organizational practices are a very strong initial market barrier for builders and HVAC contractors. Evaporative cooling technologies have almost no current recognition among consumers. In addition, contractors, installers, and suppliers have ignored this market, directing most of their efforts toward CAC.[9]

- Generally, the technology is new to the market. The supply lines are quite small, making the product appear unavailable. In addition any support required for this technology is limited, if it exists at all.

- In the new construction market, a primary barrier for many energy efficiency options may be split incentives -- the builder does not pay the energy bill and, therefore, has no incentive for making the investment to lower operating costs. This barrier is likely an issue for realtors and sales agents.

- The split incentive barrier may be experienced by HVAC contractors, as their bid for the job does not take into account differences in operating costs that will be paid by the customer.

- Information and search costs are important for all market participants, since the market for these new evaporative cooler technologies is immature. There is almost no

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[8] Volume 7: Evaporative Cooling Manufacturers Baseline "Mini-Study", Prepared for Pacific Gas and Electric Company by American Council for an Energy-Efficient Economy, Xenergy, Inc., and E-Source, March 1998;

"Field Measurement and Evaluation of an Indirect-DX Air Conditioning Systems" by Nicolas Puga and Henry Lau, *1994 ACEEE Summer Study*, pp. 3.205-3.215;

"Barriers to Non-Compressor Cooling: Air Conditioners in Social Context" by David Hall, David Hungerford, and Bruce Hackett, 1994 ACEEE Summer Study, pp. 1.59-1.63.

[9] "Why Isn't the Housing Stock More Efficient: Organizational Networks and Technology Transfer" by Loren Lutzenhiser, 1994 ACEEE Summer Study, pp. 1.109-1.118;

"Barriers to Non-Compressor Cooling: Air Conditioners in Social Context" by David Hall, David Hungerford, and Bruce Hackett, 1994 ACEEE Summer Study, pp. 1.59-1.63.

knowledge of their existence, and even less knowledge of their benefits and costs. With only the manufacturers promoting this technology, builders and HVAC contractors may discount benefits to counter potential biased information (asymmetric information). Often, consumers have not heard of this new technology and, because of problems with the prior generation of evaporative coolers, they may have uncertainties that lead them to distrust the claims made by the technology promoters.

- There are no standard ratings available for evaporative coolers and it is difficult for engineers to estimate the energy savings of the indirect systems and other new evaporative cooler technologies. The EER rating of this type of equipment is not equivalent, and understates the energy and demand savings of the new evaporative cooling technologies when compared to CAC.

- Currently, Title 24 software and Title 24 usage is itself a market barrier for the new evaporative cooling technologies. This is partially related to the rating problem, but there are also Title 24 operation issues that must be addressed for acceptance to occur.

- The negative perceptions held by customers and realtors of the prior generation of direct evaporative coolers enhances the low perception of value to cost. This is aggravated by a lack of financing to cover the incremental costs of cost-effective investment in this technology.

Exhibit 9-3
Evaporative Cooler Market Assessment
Assessing the Potential Effectiveness of Intervention Strategies

Market Participants	Strength of Market Barriers												Potential Effectiveness of Intervention Strategies		
	Performance/ Market Uncertainties	Organ. Practices	Info/ Search Costs	Hassle/Transaction Costs	Unavailability	Title 24	Focus too narrow	Split incentives	Asymetric information	Bounded rationality	Access to financing	Low Perception of Value to Cost	Training	Demonstrations (w incentives for demos)	Application for Title 24 credit
Builders	●												●		
														●	
		●													●
			●										●	●	
				●									●		
					●									●	
						●									●
							●						●	●	
								●							
									●				●		
Customers (Homebuyers)	●														
			●											●	
					●										
									●					●	
										●					
											●				
												●		●	
HVAC Contractors	●												●		
														●	
		●											●	●	
			●										●		
				●										●	
					●										
						●									●
							●						●	●	
								●							
									●				●		
Realtors/Sales agents	●													●	
												●			
			●											●	
								●							

KEY
- ● High
- ● Moderate
- ● Low

Note: Assessing Importance for Market Barriers, Relevance and Potential Effectiveness for Intervention Strategies and Programs

9.4 HOME COOLING PROGRAM ¾ INTERVENTION STRATEGIES

Intervention Strategies for product introduction market barriers include *Training*, *Demonstrations*, and working to remove institutional barriers in the *Application for Title 24 Credit* and an appropriate energy efficiency rating. Exhibit 9-3 provides an overview of how each intervention strategy maps to each market barrier.

- The primary intervention strategies for product introduction consist of providing information through demonstrations and training.
- Training should reduce product introduction barriers for builders and HVAC contractors by examining the performance of the technology, and showing how the new technologies can be implemented in the building construction industry (organizational practices for implementation).
- Training may also help provide information on how these technologies function and provide comfort within the home. In the training is viewed as informational and unbiased, rather than promotional, asymmetric information may be reduced.
- Demonstrations can provide tangible performance information to builders and HVAC contractors while also providing initial feedback from customers (indications of potential reductions in market uncertainties). The actions needed to elicit and install the demonstrations provide those involved with organizational practice re-assessments, encourage availability through all supply channels. The demonstrations should also help builders and HVAC contractors to see the cooling function more as a system, rather than having a narrow focus on air conditioning equipment alone.
- The demonstrations in model homes will also provide initial reduction of market barriers for those customers (homebuyers) and realtors/sales agents who are able to view them.
- Two important structural/procedural activities are occurring outside the TPI program to encourage the development of the evaporative cooling market. First, there is an on-going ASHRAE effort to develop a standard rating system for new evaporative cooler technologies that would be comparable to SEERs for CAC. Second, SMUD, PG&E and the Davis Energy Group (lead implementers for the TPI Home Cooling Program) are working with the California Energy Commission (CEC) to investigate and modify, as need be, Title 24 and its usage to properly represent evaporative cooling technologies. These two efforts should help reduce institutional barriers associated with the evaporative cooling technology.

Exhibit 9-4
Evaporative Cooler Market Assessment
Identification of Program Targets

Market Participants	Strength of Market Barriers												Potential Effectiveness of Intervention Strategies			Program Relevance		
	Performance/ Market Uncertainties	Organ. Practices	Info/ Search Costs	Hassle/Transaction Costs	Unavailability	Title 24	Focus too narrow	Split incentives	Asymetric information	Bounded rationality	Access to financing	Low Perception of Value to Cost	Training	Demonstrations (w/ incentives for demos)	Application for Title 24 credit	Home Cooling TPI Program	PG&E Natural Cooling	ASHRAE rating effort
Builders	●												●			●		
														●			●	
		●													●			●
													●	●		●		
			●										●				●	
				●										●			●	
					●									●		●	●	
						●									●			
							●						●	●		●	●	
								●										
									●				●			●	●	●
Customers (Homebuyers)	●													●				
			●													●		
					●													
									●					●				
										●						●		
											●							
												●		●		●		
HVAC Contractors	●												●			●		
														●			●	
															●			●
		●											●	●		●		
			●										●				●	
				●										●			●	
					●											●		
						●									●			
							●						●	●			●	
								●										
									●				●				●	●
Realtors/Sales agents	●													●		●		
												●						
			●											●				
								●										

KEY
● High
● Moderate
● Low

Note: Assessing Importance for Market Barriers, Relevance and Potential Effectiveness for Intervention Strategies and Programs

9.5 HOME COOLING PROGRAM ¾ ASSESSMENT OF POTENTIAL EFFECTIVENESS

The Home Cooling Program attempts to address the market barriers for product introduction. Exhibit 9-4 presents the key features of the Home Cooling program and determines how effectively they address the market barriers for each participant. As shown in Exhibit 9-4, the Home Cooling Program is the only program to address barriers facing *Customers (homebuyers)*, as well as those facing *Realtors and Sales Agents* by providing *Demonstrations (with incentives)* and *Training.* The ability of the TPI and related programs to successfully reduce market barriers is presented in Exhibit 9-4 and addressed below.

- The TPI Home Cooling program duplicates some of the efforts provided through other programs and was not highly effective on many fronts. In addition the project manager stated that the number of installed sites remains limited, and below project goals.

- The PG&E Natural Cooling program's effectiveness is highest in its use of product demonstrations with financial incentives. These incentives, although they encourage HVAC contractors to use the technology, seem unlikely to make a sustainable shift in the demand for evaporative coolers.

- The program was effective in training contractors. Those who participated found the sessions useful. When asked why they attended, most cited new opportunities as a reason. The implication of this result is that contractors view evaporative cooling as a potential opportunity, however, it may remain just a "potential" opportunity unless consumers demand the product.

- The ASHRAE rating effort is most effective in assisting the application for Title 24 credit. This effort has the most potential to make a sustainable shift in the demand for this product, as contractors and builders generally use Title 24 as a baseline for their building.

9.6 HOME COOLING PROGRAM ¾ IMPLEMENTATION EFFECTIVENESS

CAC replacement is a seasonal venture, in that customers usually try to have their new units in place before the cooling season begins. Given the late start, the program was not up and running until early/mid summer, thereby missing some potential opportunities. In spite of the late start, the program was able to train contractors and install sites. Surveys with contractors generally found the training useful, and stated that the attended the session because they viewed it as an opportunity to broaden their business.

While the program was able to meet its goal of training contractors and ensuring a supply and support network for evaporative coolers, the program had some problems meeting installation goals. In addition, at the time of this study, the project sponsor had not made any in roads to altering Title 24 requirements. This item is viewed by the evaluation team as being key to expansion of the market. Given that a network for supporting the product has been developed, future efforts should focus on overcoming regulatory and institutional barriers. Future efforts should focus on developing studies and documenting the energy efficiency benefits of evaporative cooling systems.

9.7 HOME COOLING PROGRAM ¾ POTENTIAL FOR SUSTAINABILITY

The evaporative-cooling technology is in its initial stages of new product introduction. Given the newness of the technology, the primary barrier is lack of awareness. The programs sponsors were successful in training contractors to install the units, and getting the units into a number of households. As for potential for sustainability, it is too early in the process to determine success. It should be noted that surveys of contractors pointed to perceived opportunities in the evaporative cooling market.

9.8 HOME COOLING PROGRAM ¾ SUMMARY

The Home Cooling program was effective in developing a support network for the evaporative coolers, however its main barrier to success likely lies in altering Title 24 standards. While the technology should be considered innovative, the implementation was similar to previous ventures.

10. RESIDENTIAL CAC SERVICE ¾ EQUIPMENT TUNE-UP

10.1 RESIDENTIAL CAC SERVICE ¾ OVERVIEW AND TECHNICAL POTENTIAL

The Third-Party Initiative (TPI) CAC Tune-Up program attempts to encourage routine maintenance of central-air conditioner (CAC) systems in California by providing software to consumers to show them opportunities for efficiency and performance gains in their CAC units.

10.1.1 Program Overview

The CAC Tune-Up program revolves around a free software tool which allows consumers to evaluate the effectiveness of their CAC systems, and determine appropriate maintenance activities. Armed with the recommendation provided by the software, consumers could then contact a contractor to implement the specific repairs. In this manner, consumers could be freed of any concern that the contractor might perform unnecessary repairs.

Contractors were also provided with copies of the CAC Tune-Up software tool to aid in evaluating and repairing ducts. Under this component of the program, contractors us the tool to improve the quality of their duct repairs. Provision of the software tool would, in turn, make it easier to decipher any requests from customers who had used the tool. The program also provided some training to contractors on how to use the software output.

According to the project sponsors, the most likely market effects of this program in California are increased higher quality tune-ups, resulting in higher energy savings impacts.

10.1.2 Program's Technical Potential

Although CAC tune-ups have significant technical potential, consumers generally only service the unit when it is malfunctioning. Energy audit and informational programs have been important in promoting this market, however it is still not standard practice. The program sponsors report that only about 25 percent of households conduct annual pre-season check-ups for adequate refrigerant charge and properly operating components. Preliminary research showed that numerous contractors offer tune-ups in cooling climates, implying market limitations are mainly a demand-side issue.

The program sponsors further indicate that field studies have shown that the average CAC unit operates at 17 percent below optimum efficiency. They further state that this may be due to improper installation of new CAC units, as well as inadequate maintenance of existing units.

Exhibit 10-1
CAC Tune-Up Market Assessment
Related Program Identification

Program	Description	Utility Sponsors				Funding ($000)	Sources
		SCE	SoCalGas	PG&E	SDG&E		
TPI Programs							
TPI CAC Tune-Up Program	Provides software to customers to help identify opportunities for tune-up and maintenance of CAC to enhance performance.			●		995	TPI Proposal
Ongoing and Planned California Programs							
Residential Retrofit & Renovation	(1) Promotion and Facilitation of Comprehensive, Discretionary Retrofit Service/CHEERS energy rating; (2) Facilitation of Efficiency Retrofit at Time-of-Sale or Renovation/ SPC; (3) Energy Efficiency Center(s)	●				6,377 (Planned for 1999)	SCE 1999 Advice Filings
Residential Retrofit & Renovation	Home Energy Fitness; Energy Facts; CHEERS; Contractor Program; 3rd party: Upstream Water heater; 3rd party Energy Efficiency Renovation Service; 3rd Party Time-of-Sale Home Inspection Energy Awareness		●			7,389 (Planned for 1999)	SoCalGas 1999 Advice Filings
Residential Retrofit & Renovation	(1) Promotion and Facilitation of Comprehensive, Discretionary Retrofit Service/ SPC and CHEERS; (2) Facilitation of Efficiency Retrofit at Time-of-Sale or Renovation; (3) General Information, Education, Branding, Labeling, Alliances; (4) Energy Efficiency Center(s)			●		7,334 (1) 1,542 (2) 4,589 (3) 1,475 (4) 14,490 (Total) (Planned for	1999 PG&E Advice Filing Update
Residential Retrofit & Renovation	(1) Promotion and Facilitation of Comprehensive, Discretionary Retrofit Service/Residential Audits; (2) Facilitation of Efficiency Retrofit at Time-of-Sale or Renovation/ SPC which promotes building envelope improvements, including high-efficiency windows; (3) Energy Efficiency Center(s)				●	5,663 (Planned for 1999)	1999 SDG&E Filing
Previous Utility Initiatives							
EMS: Residential In-Home Audit and Energy Use Profile Audit	Customers request in-home audits, and a trained energy auditor goes to the customer's home and identifies structural and appliance uses, and recommends energy efficiency changes the customer can make.	●					1998 SCE Advice Filing
Home Energy Fitness Program	Offers consumers living in single-family homes a personalized evaluation of their annual usage of natural gas, and educates them about energy savings tips.		●				1998 SoCalGas Advice Filing
Residential Audit Program	Surveys the customers' home and provides information about their energy use, how to reduce energy consumption, and the benefits of adopting energy saving measures and practices.				●	1,420	1998 SDG&E Advice Filing
Related Programs (e.g., National efforts)							
HVAC Service Rebate Program	This program offered incentives to residents for having an HVAC tune-up completed to standards indicated by the program.						City of Austin Program Report
CASST 1.2	Provides a spreadsheet program to identify beneficial upgrades and tune-up options for compressed air systems.						Energy Center of Wisconsin Web Site
Furnace Check Up	Promotes and performs pre- or off-season tune-up and maintenance of furnaces.						PSE Website and 1-800 customer service number

10.2 RES CAC SERVICE ¾ RELATED PROGRAMS

As shown in Exhibit 10-1, a number of promotional programs have been provided in California, and nationwide, to encourage CAC tune-ups. The TPI CAC Tune-Up Program differs from other programs in that it offers a detailed audit of a specific household system, the CAC unit.

- Through the 1999 Residential Retrofit and Renovation Programs, each UDC provides a CHEERS audit, which rates all the homes' major systems (including the HVAC and water heating) for energy efficiency.

- Previous energy audit programs sponsored by SCE and SDG&E provided surveys to households to generate an energy use profile, and suggest ways to lower energy usage in the home.

- The HVAC Service Rebate Program, sponsored by the City of Austin, provides a rebate to contractors and a list of tune-up specifications (very similar to those used in the TPI Project) which, are expected to achieve greater energy savings.

- The Compressed Air System Screening Tool (CASST 1.2) is most like the TPI CAC Tune-Up Program in its delivery mechanism, software. The CASST 1.2 is a spreadsheet program designed to estimate system leakage, and evaluate the benefits of 10 different efficiency measures.

- Puget Sound Energy's Furnace Check Up Program offers the efficiency tune-up and the audit as a package. For a fee, a customer can have a PSE-trained technician make sure the furnace is in optimum working order and make energy efficiency adjustments or repairs at the time of the visit.

Exhibit 10-2
CAC Tune-Up Market Assessment
Identification of Market Barriers

Market Participants	Strength of Market Barriers				
	Asymmetric Information	Bounded Rationality	Performance Uncertainties	Hassle/Transaction Costs	Organizational Practices or Customs
End Users	●				
		●			
			●		
				●	
Contractors					●

KEY	
Importance Level	● High
	● Moderate
	● Low

Note: "Importance" for a Market Barrier refers to its strength as a barrier. "Importance" for an Intervention Strategy or a Program refers to its relevance to a barrier and its Potential Effectiveness.

10.3 RES CAC SERVICE ¾ MARKET BARRIERS

An important barrier facing *End Users* is *Asymmetric Information.* Given the difficulty in assessing the true benefits of a CAC tune-up, end users may not believe the contractor and decline the service. Exhibit 10-2 presents the market barriers for each participant in the CAC repair/audit market.

- Asymmetric information and performance uncertainties are closely related barriers for this market. End-users may be reluctant to purchase a service that, on the surface, provides few tangible benefits. In addition the advertised benefits are potentially coming from the individual selling the service, thereby producing an incentive compatibility problem.

- The lifetime time of a CAC is estimated to be about 15 years**,** and many consumers remain loyal to the same contractor for the duration**.**[1] For this reason, many end users face bounded rationality, convinced that the CAC must be performing at optimum level since they are using their trusted contractor.

- The organizational practices or customs of contractors influence the method and effectiveness of CAC tune-ups. Since this service is not in high demand, contractors do not currently have an incentive to change their CAC tune-up practices.

[1] Source: Selecting Targets for Market Transformation Programs: A National Analysis; ACEEE, August 1998.

Exhibit 10-3
CAC Tune-Up Market Assessment
Assessing the Potential Effectiveness of Intervention Strategies

Market Participants	Strength of Market Barriers					Potential Effectiveness of Intervention Strategies				
	Asymmetric Information	Bounded Rationality	Performance Uncertainties	Hassle/Transaction Costs	Organizational Practices or Customs	Software Tools	Linking Customers and Vendors	Audits	Financial Incentives	Promotion
End Users	●					●				
								●		
		●					●			
			●			●				
								●		
									●	
				●			●			
									●	
										●
Contractors					●	●				
									●	

KEY

Importance Level
● High
● Moderate
● Low

Note: "Importance" for a Market Barrier refers to its strength as a barrier. "Importance" for an Intervention Strategy or a Program refers to its relevance to a barrier and its Potential Effectiveness.

10.4 RES CAC SERVICE ¾ INTERVENTION STRATEGIES

Software Tools may be somewhat effective in reducing *End Users' Asymmetric Information* and *Performance Uncertainties*. By being involved in the CAC tune-up evaluation, end users will be more informed and better able to guard against opportunism resulting from asymmetric information. Additional intervention strategies and the market barriers, as shown in Exhibit 10-3, include the following:

- Linking customers and vendors reduces hassle and transactions costs for end users trying to locate high-quality tune-up technicians. Bounded rationality can potentially be reduced if the linkages introduce end users to new contractors.

- Audits and the software tools may assist in reduction of asymmetric information and performance uncertainties; the audits are potentially more effective. Since the audits are conducted by a representative from a trusted and unbiased source, the UDC, end users are more likely to believe and use the recommendations.

- Financial incentives, in the form of savings, may help compensate for the hassle and transaction costs faced by the end user. If the end user needs to pay the full price for the tune-up and be home to meet the technician, he may decide the service is not worthwhile.

- For contractors, financial incentives may also help to change organizational customs and practices, by allowing them to try something new without harming their profits.

- Promotion of the CAC tune-up services could reduce end users' information and search costs by actively informing them that the service exists.

Exhibit 10-4
CAC Tune-Up Market Assessment
Identification of Program Targets

Market Participants	Strength of Market Barriers					Potential Effectiveness of Intervention Strategies				Program Targets							
	Asymmetric Information	Bounded Rationality	Performance Uncertainties	Hassle/Transaction Costs	Organizational Practices or Customs	Software Tools	Linking Customers and Vendors	Audits	Financial Incentives	Promotion	**TPI CAC Tune-Up Program**	CASST 1.2	Residential Retrofit & Renovation (CHEERS)	EMS: Residential In-Home Audit and Energy Use Profile Audit	Home Energy Fitness Program	HVAC Service Rebate Program	Residential Audit Program	Furnace Check Up
End Users	●					●					●	●						
		●					●	●					●	●	●		●	●
			●			●					●	●						
								●					●	●	●		●	●
				●					●							●		
							●				●							
									●									●
										●	●							
Contractors					●	●					●							
									●							●		

KEY

Importance Level
- ● High
- ● Moderate
- ● Low

Note: "Importance" for a Market Barrier refers to its strength as a barrier. "Importance" for an Intervention Strategy or a Program refers to its relevance to a barrier and its Potential Effectiveness.

10.5 RES CAC SERVICE ¾ ASSESSMENT OF POTENTIAL EFFECTIVENESS

The TPI CAC Tune-up Program selected one intervention, software tools, to address performance uncertainties and asymmetric information faced by end users. The program also targeted organizational customs and practices faced by contractors. Exhibit 10-4 shows how features of the TPI and related programs are effective, or ineffective, in reducing market barriers. For example, the *TPI CAC Tune-Up Program*, through its *Software Tools,* was moderately successful in reducing *Asymmetric Information* barriers facing *End Users*. The TPI CAC Tune-Up program was only moderately success because the tool was difficult to use. The potential effectiveness of TPI and related programs is discussed below.

- The CASST 1.2 Program is most like the TPI CAC Tune-Up Program in its use of a software tool to decrease performance uncertainties and asymmetric information for end users. If the distribution of the software tool is wide enough, and contractors use it, the increased supply of high-quality tune-ups can be sustained. This method is likely only effective in companies that regularly employ computers in their work. If the software is difficult for consumers to use, as was the case with the TPI program, than any reduction in information related barriers will be minimal.

- The Residential Retrofit and Renovation Program, SCE's EMS Program, and SDG&E's Residential Audit Program all use walk-through, mail-in, or telephone survey audits to address the same barriers as the TPI program. Audits yield a lot of information and suggestions about how to improve the energy efficiency of home appliances, but are not very effective because home owners generally do not take the steps necessary to implement the suggested changes. Review of previous studies shows that the likelihood of this intervention sustaining a demand shift for high-quality tune-ups is slim.

- Puget Sound Energy's Furnace Check and the City of Austin's HVAC Service Rebate Program used financial incentives to convince contractors to perform HVAC service and tune-ups. Review of previous energy efficiency program evaluation's shows that when financial incentives are removed, the programs and activities are less cost-effective , and promoted activities generally cease.

10.6 RES CAC SERVICE ¾ IMPLEMENTATION EFFECTIVENESS

The CAC Tune-up program was effective in getting the software in the hands of end-users, and providing contractors with a tool to increase the quality of their repair services. Given that the software was difficult for end users to navigate, the project did not accomplish one of its main objectives – getting accurate unbiased repair information into the hands of end users.[2] In general the project should be considered a good idea, with poor execution.

10.7 RES CAC SERVICE ¾ POTENTIAL FOR SUSTAINABILITY

Provision of the software tool directly to end-users was innovative. However, the software tool's ability to reduce informational barriers for end users would be better if it were easier to use. While the software's results are very accurate, it requires the expertise of a technician. Making the software simple enough for the end user to make an assessment on their own would likely increase the potential for a sustainable shift in consumer demand. Interviews with the project manager revealed that few end users actually used the software themselves. A few even hired contractors to help them perform the analysis – a clear indication of the software's difficulty.

Providing contractors and their technicians with new ways to market service calls to customers should be considered innovative. As stated above, the software tool initiated some interest among end users, however not in the intended way. Although this marketing method is effective, the software tool should not be considered innovative when compared to related programs. The information that is gathered for the energy analysis does not differ greatly from that of previous methods, such as audits.

Market effects, as indicated by the final report from the project sponsors, are as follows:

- Results of interviews and surveys with consumers and technicians indicate that they would be willing to pay for the tune-up software. However, ease of use will obviously need to be addressed before sales increase to create a sustainable demand for the product.

- Contractors also said they would definitely consider using these tune-up techniques in the future. Furthermore, one respondent indicated that although the new tune-up procedure was not easy, it was definitely better. To sustain the implementation of the improved tune-up methods, a greater number of technicians must be introduced to and sold on the concepts presented by the software.

The likelihood of this specific program being sustainable is small given the difficulty end-users encountered when trying to use it. The software may have some promise in promoting and marketing CAC tune-ups, in that end users may be willing to trust the output that comes from potentially less biased source like software. The claim that end users would be willing to pay for the software should be investigated further.

[2] The evaluation team did use the software tool and can confirm its difficulty.

10.8 RES CAC SERVICE ¾ SUMMARY

The TPI CAC Tune-up program did have some innovative concepts. The execution of these concepts however, was not very effective. By providing end users with accurate unbiased information the program had potential to move the market for CAC tune-ups, but only if the software is used.

11. HOME WARRANTY

11.1 HOME WARRANTY ¾ OVERVIEW AND TECHNICAL POTENTIAL

The Third-Party Initiative Home Warranty Program attempts to induce whole-house energy-efficient retrofits in by increasing the number of walk-through audits, and annually following-up on the implementation of recommendations.

11.1.1 Program Overview

The Home Warranty program uses an appliance (HVAC and water heater) warranty as a vehicle for increasing both the number of home energy audits and the follow through on recommendations. As an added benefit to purchasing a warranty, program participants are given a California Home Energy Efficiency Rating System (CHEERS) audit, water heater wrap and strap, and a programmable thermostat, installed. In most audit programs, there is little follow through on the recommendations. The Home Warranty program, with its annual warranty renewal provides an opportunity to follow up on recommendations provided by the audit. The program also serves as a "general contractor" for implementation of any energy efficiency recommendations by working with groups like plumbers and electricians.

The discretionary whole-house retrofit is a relatively new market. Consumers often consider replacement of house systems one at a time, and then, usually only when it breaks down, or performs poorly. The program sponsors indicate that over the past 15 years, approximately 30 percent of homes have received preliminary or detailed home energy audits, but less than one percent of homes have actually implemented the recommended energy conservation measures.[1] Although implementation of energy conservation measures has significant technical potential in California and nationwide, consumers generally do not perform such retrofits without incentives.

11.1.1 Program's Technical Potential

Increasing the number of whole-house retrofits has technical potential, if the recommendations are implemented.

- Residential infiltration reduction has the potential to reduce energy consumption by 186 GWh and 5 Tbtus.

- Air conditioning maintenance has the potential to reduce energy consumption by 324 GWh. Implementing both air conditioning maintenance and residential infiltration reduction will reduce the combined effect.

[1] Source: Home Warranty Program Proposal, The California Energy Commission

- Inclusion of other measures, such as high efficiency windows and energy efficient appliance retrofit, will increase the technical potential of the whole-house retrofit market.

Exhibit 11-1
Comprehensive Retrofit Market Assessment
Related Program Identification

Program	Description	Utility Sponsors				Funding ($000)	Sources
		SCE	SoCalGas	PG&E	SDG&E		
TPI Programs							
TPI Home Warranty Program	Performs a CHEERS audit, and installs energy-savings measures upon customer's purchase of a one-year service contract for the HVAC and plumbing systems.	●	●			990	
Ongoing and Planned California Programs							
Residential Retrofit & Renovation	(1) Promotion and Facilitation of Comprehensive, Discretionary Retrofit Service/CHEERS energy rating; (2) Facilitation of Efficiency Retrofit at Time-of-Sale or Renovation/ SPC; (3) Energy Efficiency Center(s)	●				6,377 (Planned for 1999)	SCE 1999 Advice Filings
Residential Retrofit & Renovation	Home Energy Fitness; Energy Facts; CHEERS; Contractor Program; 3rd party: Upstream Water heater; 3rd party Energy Efficiency Renovation Service; 3rd Party Time-of-Sale Home Inspection Energy Awareness		●			7,389 (Planned for 1999)	SoCalGas 1999 Advice Filings
Residential Retrofit & Renovation	(1) Promotion and Facilitation of Comprehensive, Discretionary Retrofit Service/ SPC and CHEERS; (2) Facilitation of Efficiency Retrofit at Time-of-Sale or Renovation; (3) General Information, Education, Branding, Labeling, Alliances; (4) Energy Efficiency Center(s)			●		7,334 (1) 1,542 (2) 4,589 (3) 1,475 (4) 14,490 (Total) (Planned for 1999)	1999 PG&E Advice Filing Update
Residential Retrofit & Renovation	(1) Promotion and Facilitation of Comprehensive, Discretionary Retrofit Service/Residential Audits; (2) Facilitation of Efficiency Retrofit at Time-of-Sale or Renovation/ SPC which promotes building envelope improvements, including high-efficiency windows; (3) Energy Efficiency Center(s)				●	(Planned for 1999)	1999 CBEE Filing
Previous Utility Initiatives							
EMS: Residential In-Home Audit and Energy Use Profile Audit	Customers request in-home audits, and a trained energy auditor goes to the customer's home and identifies structural and appliance uses, and recommends energy efficiency changes the customer can make.	●					1998 SCE Advice Filing
Home Energy Fitness Program	Offers consumers living in single-family homes a personalized evaluation of their annual usage of natural gas, and educates them about energy savings tips.		●				1998 SoCalGas Advice Filing
Residential Audit Program	Surveys the customers' home and provides information about their energy use, how to reduce energy consumption, and the benefits of adopting energy saving measures and practices.				●	1,420	1998 SDG&E Advice Filing
Related Programs (e.g., National efforts)							
Building Performance Contractors Association	Contractors and marketing partners who promote whole-house retrofit and increased residential building performance.						BPCA Web Site
Home Owner's Insurance	Provides appliance and house shell replacement assistance to compensate loss.						Insurance Information Institute Web Site
Home Energy Checkup Program and Quick Energy Savings Test (QUEST)	Provides a walk-through home audit and energy savings suggestions based on appliance information submitted by the consumer.						HLP Web Site (This program should be representative of the type of program run by most utilities who have a walk-through audit)
On-Line Energy Audits	On-line form that allows consumer to enter specifics about their home and general energy use. Using this information, the tool estimates the annual electricity bill, suggests appliance and envelope changes and provides average bill savings resulting from installed measures.						Home Energy Saver Website - Sponsored by Energy Star
Home Energy Audits Information	Provides information on how to conduct a do-it-yourself in-home audit, and information on how to procure a contractor who can perform an audit correctly.						EREN Website

11.2 HOME WARRANTY ¾ RELATED PROGRAMS

Energy audit and informational programs have been important in promoting house system retrofits. Although energy-use audits can result in significant installation of energy conservation measures, they are not effective in all cases due to lack of follow through. A number of promotional programs, as shown in Exhibit 11-1, have been implemented in California and nationwide.

When compared with related programs, the Home Warranty Program differs most because the warranty provides for entry into the home on a yearly basis to continue promotion of new energy conservation measures, and to increase the chances of energy conservation measure (ECM) installation. In addition, warranty repairs and maintenance can increase the efficiency of operation of covered equipment. Historically, audit programs have presented consumers with pertinent information on how to target conservation measures. However these suggestions were rarely acted upon. Related programs are detailed below.

- The Building Performance Contractors Association (BPCA) helps promote whole-building performance. Made up of utilities, manufacturers, and contractors who routinely use performance testing, the association provides contractor training, educational materials, and forms alliances to build contractor business.

- Through the Residential Retrofit and Renovation Programs, sponsored by SCE, SoCalGas, PG&E, and SDG&E in 1999, each UDC provides a CHEERS audit, which rates all the homes' major systems (including the HVAC and water heating) for energy efficiency. Previously, energy audit programs surveyed households to generate an energy use profile, and then provided suggestions about ways to lower energy usage in the home. These programs did not follow up to ensure adoption of ECMs.

- The Home Energy Checkup Program and Quick Energy Savings Test (QUEST), offered by Houston Light and Power (HL&P), is exemplary of the kind of audit programs offered by many utilities around the country. Like those previously sponsored by California UDCs, it offers a walk-through audit and recommends ECMs to the customer. Similar to the California programs, it does not follow up to ensure implementation.

- The Home Energy Saver Program, sponsored by the U.S. Department of Energy (DOE), provides an on-line form allowing customers to specify their major appliances, energy use patterns, home vintage, location and other variables. The responses are used to estimate the customer's current energy expenditures (in dollars) and to recommend ECMs. Billing savings estimates are provided along with each ECM recommendation.

- The Energy Efficiency and Renewable Energy Network, also part of the DOE, provides information on how to conduct a "do-it-yourself" in-home audit. General recommendations for ECMs and information about choosing a contractor to perform a more detailed audit are also provided.

- Most forms of home insurance are similar because they assist whole-house retrofit in the event of disaster. They also help facilitate relationships between consumers and vendors.

Exhibit 11-2
Comprehensive Retrofit Market Assessment
Identification of Market Barriers

Market Participants	Strength of Market Barriers								
	Perceived Low Value/Cost	Access to Financing	Information and Search Costs	Asymmetric Information	Hassle/Transaction Costs	Bounded Rationality	Performance Uncertainties	Organizational Practices or Customs	Market Uncertainties
End Users	●								
		●							
			●						
				●					
					●				
						●			
							●		
Contractors			●						
					●				
								●	
									●
CHEERS Audit Contractors									●
Financing Entities									●
Service Aggregator					●				
								●	
									●
Underwriters							●		
									●

KEY	
Importance Level	● High ● Moderate ● Low

Note: "Importance" for a Market Barrier refers to its strength as a barrier. "Importance" for an Intervention Strategy or a Program refers to its relevance to a barrier and its Potential Effectiveness.

11.3 HOME WARRANTY ¾ MARKET BARRIERS

The comprehensive retrofit market is just beginning to be formed since numerous barriers face the market participants. An important barrier preventing *End Users* from implementing comprehensive retrofits is a low *Perceived Value/Cost* ratio. *Access to Financing* is another barrier in moving the market for *End Users*. Additional barriers and their roles, shown in Exhibit 11-2, are discussed below.

- Although home energy audits produce clear ECM recommendations, many end users avoid installation because they may not perceive the full value of the implementation. Given that implementation of ECMs can be costly, access to financing poses a significant barrier to end users. Access to financing can also help reduce the low perceived value/cost ratio by reducing the up-front cost.

- For end users, the information and search costs barrier associated with finding an audit program can be a strong deterrent. Previous audit programs sponsored by utilities were generally suggested to customers in response to a high bill complaint, not necessarily to *all* homeowners. For contractors trying to perform the retrofit services, and testing, these costs associated with finding customers may be high as well.

- Given the difficulty of assessing the true benefits of ECM installation, asymmetric information can be significant for the end users. If the consumer is not well educated about ECMs, he must rely on the recommendations of the audit professional, who may not have the end user's best interests in mind.

- Hassle and transactions costs, in the case of finding and contracting with all the appropriate professionals, are another strong deterrent for the end user and the service aggregator.[2]

- Bounded rationality, though of low importance to end users, is tied closely with hassle and transactions costs. Collecting information about the home and its systems will be difficult. Finding contractors to service each system and measure may be too much for consumers.

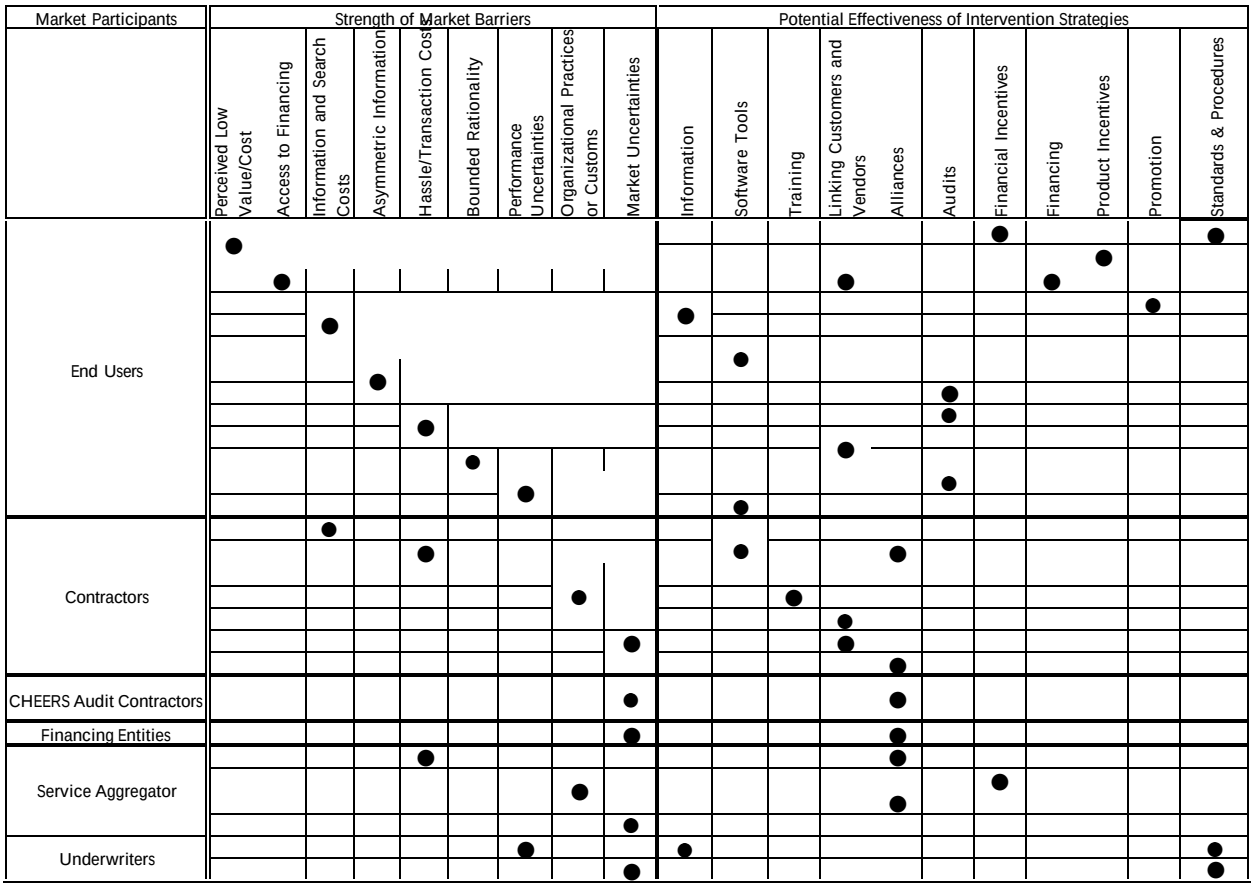
- Performance uncertainties held by end users may be attributed to the fact that many end users are unsure of claims contractors make about the benefits of recommended ECMs.

- The organizational practices or customs barriers affect contractors moderately because they may not offer the full realm of services required by customers. In addition, coordination with other contractors through the service aggregator may deviate from current practices. Service aggregators are unlikely to package all of the services required to perform a whole-house retrofit.

[2] Service aggregators serve as a general contractor for whole house retrofit.

- This lack of demand for whole-house retrofits can be closely tied to the significant market uncertainties held by both warranty contractors and CHEERS audit contractors. This barrier is less for CHEERS certified contractors, as the CHEERS certification is usually a side activity to enhance credibility and business. Alternatively, a contractor may be hired by a utility to perform audits, thus creating a guarantee of business.

Exhibit 11-3
Comprehensive Retrofit Market Assessment
Assessing the Potential Effectiveness of Intervention Strategies



KEY	
Importance Level	High
	Moderate
	Low

Note: "Importance" for a Market Barrier refers to its strength as a barrier. "Importance" for an Intervention Strategy or a Program refers to its relevance to a barrier and its Potential Effectiveness.

11.4 HOME WARRANTY ¾ INTERVENTION STRATEGIES

Many of the intervention strategies for this market address multiple barriers. Exhibit 11-3 shows that *Information* and *Promotion* can be the most effective in reducing *End Users' Information and Search Costs*. Discussion of additional effective interventions in the comprehensive retrofit market follows.

- Software tools can be somewhat effective in reducing asymmetric information and performance uncertainties for end users. Able to derive the results first-hand, the end user can learn the potential effects of ECMs, and need not fear any opportunism on the contractor's part. Software tools can also help the contractor learn the benefits of ECMs as well.

- Training for contractors may help insure that they can install the new ECMs properly. This could result in increased business, through word of mouth of satisfied end users.

- Linking customers and vendors might reduce hassle and transactions costs for end users trying to locate contractors to perform a wide range of services. In addition, bounded rationality may be reduced if end users are presented with consolidated services rather than having to locate them individually. Access to financing may increase if any of the vendors is a financial entity (e.g., the home warranty provider.)

- Alliances could help reduce market uncertainties for CHEERS audit contractors if they know that all parties will make a consolidated effort to provide the product.
  - Alliances requiring the use of a CHEERS audit guarantee some demand for the CHEERS auditor.
  - When allied with the CHEERS contractors, financial entities are able to access the energy savings information generated by the audit and incorporate it into their valuations.
  - Alliances may help reduce the work a service aggregator is required to perform.

- Audits and the software tool may assist in reducing asymmetric information and performance uncertainties; the audit may be more effective. If a representative from a trusted source such as a UDC conducts audits, end users may be more likely to believe and use the recommendations.

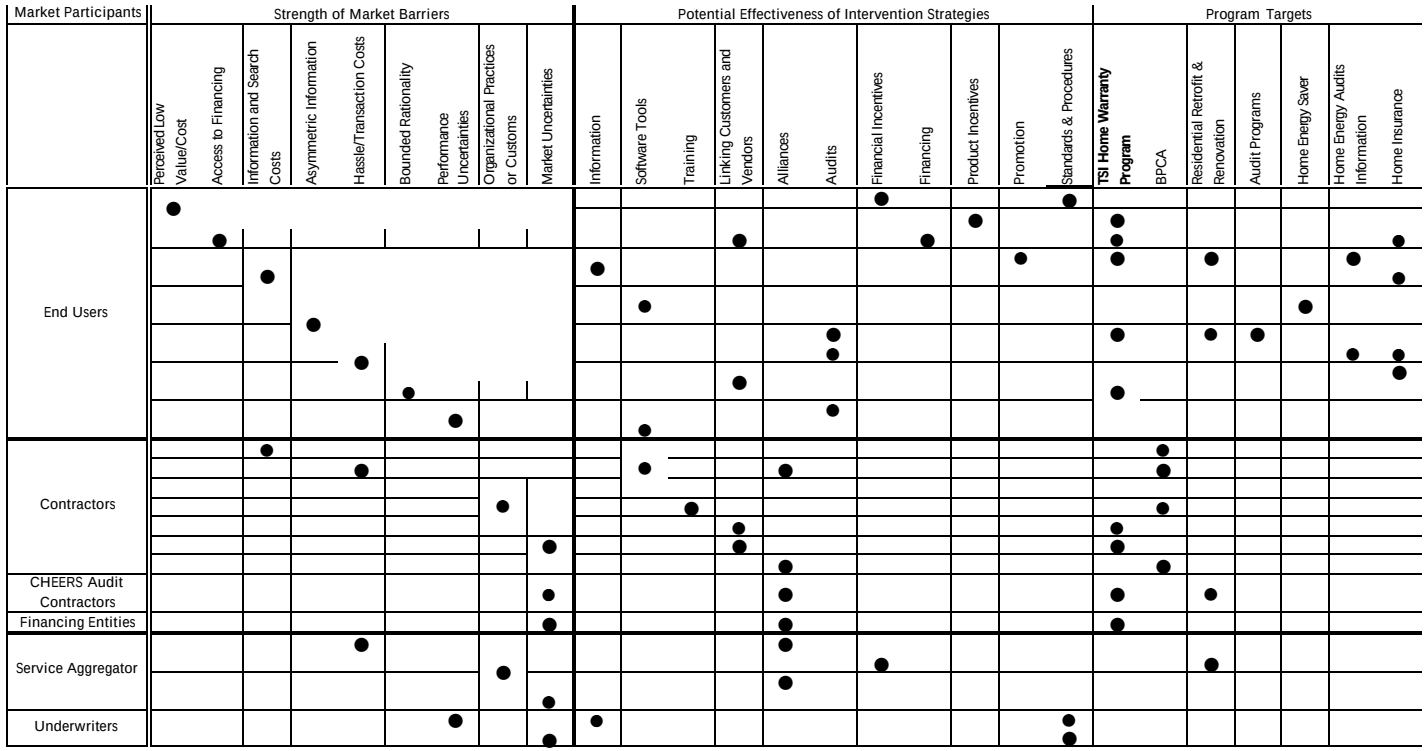
- Financial incentives can help compensate for the low perceived value to cost ratio held by the end user. They not only reduce the cost, but also if offered by a credible source, they provide an assurance of significant energy savings value.

- Financing may simply make it easier to pay for a whole-house retrofit. In addition, financing may reduce the low perceived value/cost by reducing the immediate financial (cost) burden.

- Product incentives, such as low-cost water-heater wraps and setback devices, may change end user's low perceived value to cost ratio by starting the savings payback

immediately. In this way end users will see the benefits of ECMs and may be convinced that the perceived high cost is worthwhile.

Exhibit 11-4
Comprehensive Retrofit Market Assessment
Identification of Program Targets



KEY

Importance Level: High, Moderate, Low

Note: "Importance" for a Market Barrier refers to its strength as a barrier. "Importance" for an Intervention Strategy or a Program refers to its relevance to a barrier and its Potential Effectiveness.

11.5 HOME WARRANTY ¾ ASSESSMENT OF POTENTIAL EFFECTIVENESS

Attempting to address all the market barriers faced by end users, warranty service contractors, CHEERS audit contractors, and financing entities, the Home Warranty Program selected a combination of six intervention methods. Exhibit 11-4 describes how the program, and related programs, is effective or ineffective in reducing market barriers. For example, the *Residential Retrofit & Renovation Program*, by offering *Promotion* and *Information,* reduces the *Information and Search Costs* facing *End Users*.

- The Home Warranty Program duplicates a few of the efforts made by other programs, but has by far the widest scope. This is the only program that addresses the barriers facing most of the market actors by coordinating their efforts through alliances and other links. This program could be relatively effective in increasing end user demand for whole-house maintenance and retrofits, since it aggregates all services (reducing the hassle costs facing end users).

- The BPCA has a goal similar to the Home Warranty Program, but concentrates its efforts on contractors. This program has the potential to affect the other market actors, as the BPCA helps contractors market their services.

- Other related programs focus their efforts almost exclusively on end users, by offering audits and promotion. While both these approaches help make end users aware of energy efficient practices, the suggested changes are generally not implemented.

11.6 HOME WARRANTY ¾ IMPLEMENTATION EFFECTIVENESS

The coordination efforts required for this program were great, and in the end was the likely downfall of the program. By the end of 1998, the program had only managed to issue three warranties, rather than the 3,000 projected for SoCalGas and SCE. Interviews with the UDC project managers revealed that the members of the sponsor team were not able to coordinate amongst themselves many of the project activities. The project reached a low point when a UDC project manager had to intervene to get the parties to communicate with each other – this meeting took place at the UDC. In general the project had some innovative ideas, but the execution was poor.

11.7 HOME WARRANTY ¾ POTENTIAL FOR SUSTAINABILITY

This section evaluates how well the Home Warranty Program met its goals. Where many of the TPI projects set out modest goals, the Home Warranty was, relatively speaking, bold. Given the coordination efforts required for this program, it is not surprising that only three home warranties were issued this year. While the concept of following up on audit recommendations and serving as a general contractor was innovative, the execution was ineffective.

- The most likely market effects of efforts like the Home Warranty Program are:
  - An increase in implementation of ECM recommendations. As stated earlier, there are a number of audit programs within California and beyond, none of which follow up with customer to ensure the adoption of the ECM recommendations. The Home warranty not only provides a mechanism to follow up, but also makes it easier to do so by serving as a general contractor.
  - By forming alliances with numerous actors in the market, the program may induce more retrofits as communication between the network increases.
  - The project proposal stated two additional effects: increased importance of residential energy ratings in home transactions, and better maintenance of current home HVAC and plumbing systems.
- The proposed combination of partners and their activities can address the wide range of barriers and end user combinations, although the coordination effort will continue to be difficult.
- The coordination difficulties this past year rendered the program completely ineffective in creating market effects.
- Until the coordination effort becomes streamlined, with multiple actors profiting from working together and/or one aggregator profiting from the coordination activities, neither the consolidated effort nor the demand for whole-house retrofits will be sustained. The hassle and transactions costs are too high for any large number of end users to want to do this themselves.

11.8 HOME WARRANTY ¾ SUMMARY

The Home Warranty program was a case of good idea, poor execution. Combining and coordinating such a large and broad group has the potential to be effective – following up on recommendations only increases potential effectiveness. If the difficulties in coordinating activities can be overcome, the concept may bear fruit, but not before.

12. ENERGY STAR FLUORESCENT TORCHIERE

12.1 ENERGY STAR® RESIDENTIAL TORCHIERE ¾ OVERVIEW AND TECHNICAL POTENTIAL

The ENERGY STAR® Residential Torchiere Program is designed to get ENERGY STAR® torchieres into the hands of those with limited access to such products, namely college students and those in rural communities.

12.1.1 Program Overview

The ENERGY STAR® Residential Torchiere program complements other UDC programs as one aspect of a comprehensive effort to increase energy efficiency in lighting. It consists of a web site and related support facilities designed to provide consumers with an alternative communication and distribution channel that supplements the normal retail system. The web site offers information about energy-efficient torchieres, including links to manufacturers participating in the ENERGY STAR® program. It also offers the option to buy qualifying products through the web site or direct mail. Those targeted include both residential customers and educational institutions.

12.1.2 Program's Technical Potential

The technical potential of substituting compact fluorescent torchieres for those using halogen lights is considerable. More than 40 million halogen torchieres may now be found in homes, dormitories, and offices. Each of these uses up to 600 watts of power, compared with compact fluorescent alternatives that use a maximum of 100 watts. The potential savings from the use of energy-efficient torchieres vary by the difference between the CFL wattage and the incandescent wattage to be replaced, as well as the annual hours of operation. One sample calculation, assuming 1,060 hours of use, indicates that substituting a 60 W CFL for a 250 W incandescent in an indoor torchiere could save more than 200 kWh, annually.

Exhibit 12-1
ENERGY STAR® Residential Torchiere Market Assessment
Related Program Identification

Program	Description	Utility Sponsors				Funding ($000)	Sources
		SCE	SoCalGas	PG&E	SDG&E		
TPI Programs							
Energy Star Fluorescent Torch Program	Provides a website with information and opportunity to purchase Energy Star Torchiere lamps at a discounted price.			●		290	TPI Program Proposal
Ongoing and Planned California Programs							
Residential Lighting	Provides targeted information and market facilitation, and improved residential lighting fixtures.	●				3,054	SCE 1999 Advice Filings
Residential Lighting	Provides targeted information and market facilitation, and improved residential lighting fixtures.			●		6,988 (2,795 for Torchieres only)	PG&E 1999 Advice Filings Update
Residential Lighting	Provides targeted information and market facilitation, and improved residential lighting fixtures.				●	2,603	SDG&E 1999 Advice Filings
Previous Utility Initiatives							
LightWise	Designed to be complementary to Energy Star program; includes participation agreements with retailers, who, will conduct education and training seminars for retail sales people. Also use their website for promotion.	●				4,300	SCE 1998 Advice Filings
LightWise	Promotion of efficient lighting fixtures, including Energy Star Torch lamps, Smarter Energy Website, and Energy Star labeling.			●		3,780	PG&E 1998 Advice Filings Update
Residential Lighting	Coordinated promotional effort with NEEA, with specific activities including bill inserts and advertisement, in addition to promotion through the website. Also worked with manufacturers to lower upstream incentive requirements.				●	2,272	SDG&E 1998 Advice Filings
Related Programs (e.g., National efforts)							
EN Residential Torchiere Program	Coordinated effort with Energy Star to actively promote energy-efficient lighting fixtures and consumer education.					2,400 (over 30 mos.)	NEEA Website

12.2 ENERGY STAR® RESIDENTIAL TORCHIERE ¾ RELATED PROGRAMS

The TPI-supported project to increase the penetration of fluorescent torchieres fills a unique niche among other efforts to enhance the use of energy-efficient lighting by California residential consumers. A brief review of three types of programs helps provide a context for understanding this project and its objectives. This section considers the following program groupings:

- Other residential ENERGY STAR® lighting programs in California
- Related energy-efficient torchiere programs outside of California
- Other efforts to use web sites in selling energy-efficient products

California UDCs are addressing residential lighting efficiency through a number of programs and mechanisms. Of most immediate relevance, PG&E, SCE, and SDG&E are all among the sponsors of the LightWise Program that offers financial incentives to selected manufacturers to encourage the distribution and sales of energy-efficient torchieres (among other lighting fixtures). Participating manufacturers were selected through a competitive procurement open only to those manufacturers qualifying for the ENERGY STAR® designation. In addition, the program includes a consumer awareness campaign, emphasizing the benefits of efficient units. Other aspects of the program include training of sales staff in participating retail stores.

Among other efforts to induce customers to substitute energy-efficient torchieres for halogen alternatives, the most relevant is that in the Pacific Northwest, offered by the Northwest Alliance for Energy Efficiency. The Alliance, in coordination with the ENERGY STAR® program, encourages active retail promotions of energy-efficient lighting fixtures and consumer education. The Alliance also offers performance awards to manufacturers and wholesalers to address product availability, consumer awareness, and high retail costs. Indeed, the California UDC efforts described above are proceeding in coordination with the Alliance to ensure a broad and coordinated regional base for distributing and selling efficient products.

In contrast, the Northeast Energy Efficiency Partnerships may be likely to conduct some efforts relating to this technology, but have not stressed it yet. Rather, the current emphasis of stakeholders (including NYSERDA) is in attempting to increase the energy efficiency of recessed fixtures that are being included in new construction. Some degree of attention is being paid to this technology in Wisconsin, and this is expected to increase in the near future.

Not surprisingly, the program designs involved in these various initiatives are relatively similar, since the sponsor of the TPI initiative is active in these other areas as well. Major differences lie in the integration or separation of the ordinary retail distribution channel and the web-based distribution channel.

It should also be noted that some universities are banning halogen torchieres because they pose a fire hazard. Similarly, some fire companies and insurance companies are publicizing

these safety concerns. However, these efforts do not translate directly into promotion of energy-efficient options.

Several other attempts to use web sites as purveyors of information on energy efficiency and as venues for selling related products are ongoing. Among the relevant sites aimed at the residential market are those established by UDCs. For example, Southern California Edison, at www.edisonx.com, offers access to web pages that provide energy-saving tips and useful information on energy efficient appliances and equipment. Interactive features include opportunities to sign up for programs and services, to estimate appliance and equipment energy costs, and to obtain the latest information on energy-efficient technologies.

A private sector entrant in this market sector is Nexus, at www.energyguide.com. This site also offers information about a variety of energy-efficient products, including compact fluorescent torchieres, as well as opportunities to purchase many of those products (with rebates, when offered by the utility serving the customer). In addition, it offers software to estimate the consumer's energy-savings potential and to compare offers from power providers, and links to related sites.

Exhibit 12-2
ENERGY STAR® Residential Torchiere Market Assessment
Identification of Market Barriers

Market Participants	Strength of Market Barriers							
	Information/Search Costs	Performance Uncertainties	Bounded Rationality	Unavailability	Perceived Low Value/Cost	Hassle/Transaction Costs	Market Uncertainties	Asymmetric Information
End Users	●							
		●						
			●					
				●				
					●			
						●		
								●
Retailers and Distributors		●						
				●				
						●		
							●	
Fixture Manufacturers		●						
							●	

KEY		
Importance Level	●	High
	●	Moderate
	●	Low

"Importance" for a Market Barrier refers to its strength as a barrier.
"Importance" for an Intervention Strategy or a Program refers to its relevance to a barrier and its potential effectiveness.

12.3 ENERGY STAR® RESIDENTIAL TORCHIERE ¾ MARKET BARRIERS

The deployment of energy-efficient fluorescent torchieres is impeded by barriers at all levels of the manufacturing and distribution chain. The barriers and their relationship to each market actor are presented in Exhibit 12-2, and discussed in detail below.

- Primary market barriers to the penetration of these products at the end user level include high information and search costs, due to lack of awareness/knowledge of efficiency benefits, product options, and attributes of efficient equipment. Given the novelty of the newer equipment, performance uncertainties may also be a factor.

- Lacking pertinent information, end users operate under conditions of bounded rationality, tending to purchase fixtures and lamps that are more familiar. Additional barriers may be found in the unavailability of efficient units (particularly in the styles and quality that may be desired), and the search/hassle costs associated with finding efficient units. Finally, as might be expected, given the limited demand to date, end users have a perceived low value/cost ratio with respect to these units.

- In addition, midstream market actors face barriers to the sale of energy-efficient fluorescent torchieres. They also encounter some unavailability, search/hassle costs to find products for their showroom, and uncertainties about product performance. All of these concerns affect their willingness to stock and promote these units, and may be summarized to a degree under the umbrella of market uncertainties — the fear that investments in qualifying torchieres will not provide the economic returns needed and may indeed have negative effects on their reputation.

- Finally, upstream market actors also encounter barriers to the manufacture and promotion of energy-efficient fluorescent torchieres. They do recognize performance uncertainties of the units themselves and the need to invest in improvements in design and manufacturing processes. Moreover, they must invest in improving the information materials provided to their distributors and retailers, as well as assisting with promotions to consumers. Similar to the midstream market actors, they must also gauge their investments against considerable uncertainty about the ultimate consumer demand for these products.

Exhibit 12-3
ENERGY STAR® Residential Torchiere Market Assessment
Assessing the Potential Effectiveness of Intervention Strategies

Market Participants	Strength of Market Barriers								Relevance and Potential Effectiveness of Intervention Strategies				
	Information/Search Costs	Performance Uncertainties	Bounded Rationality	Unavailability	Perceived Low Value/Cost	Hassle/Transaction Costs	Market Uncertainties	Asymmetric Information	Information	Promotion	Linking Customers with Purchase Opportunities	Sales Training	Financial Incentives
End Users	●								●				
										●			
												●	
		●								●			
												●	
			●						●	●			
												●	
				●							●		
					●								●
						●					●		
								●	●				
Retailers and Distributors		●		●								●	
						●							●
										●			
							●					●	
													●
Fixture Manufacturers		●											●
													●
							●			●			
											●		

KEY

Importance Level: ● High ● Moderate ● Low

"Importance" for a Market Barrier refers to its strength as a barrier.

"Importance" for an Intervention Strategy or a Program refers to its relevance to a barrier and its potential effectiveness.

12.4 ENERGY STAR® RESIDENTIAL TORCHIERE ¾ INTERVENTION STRATEGIES

The TPI initiative to increase the sale of energy-efficient fluorescent torchieres is designed specifically to address several consumer barriers; namely, *Information and Search Costs* due lack of awareness/knowledge, *Product Unavailability*, and *Hassle/Transaction Costs*. In doing so, the project also attempts to deal with the cost versus value problem. The remaining intervention strategies are presented in Exhibit 12-3.

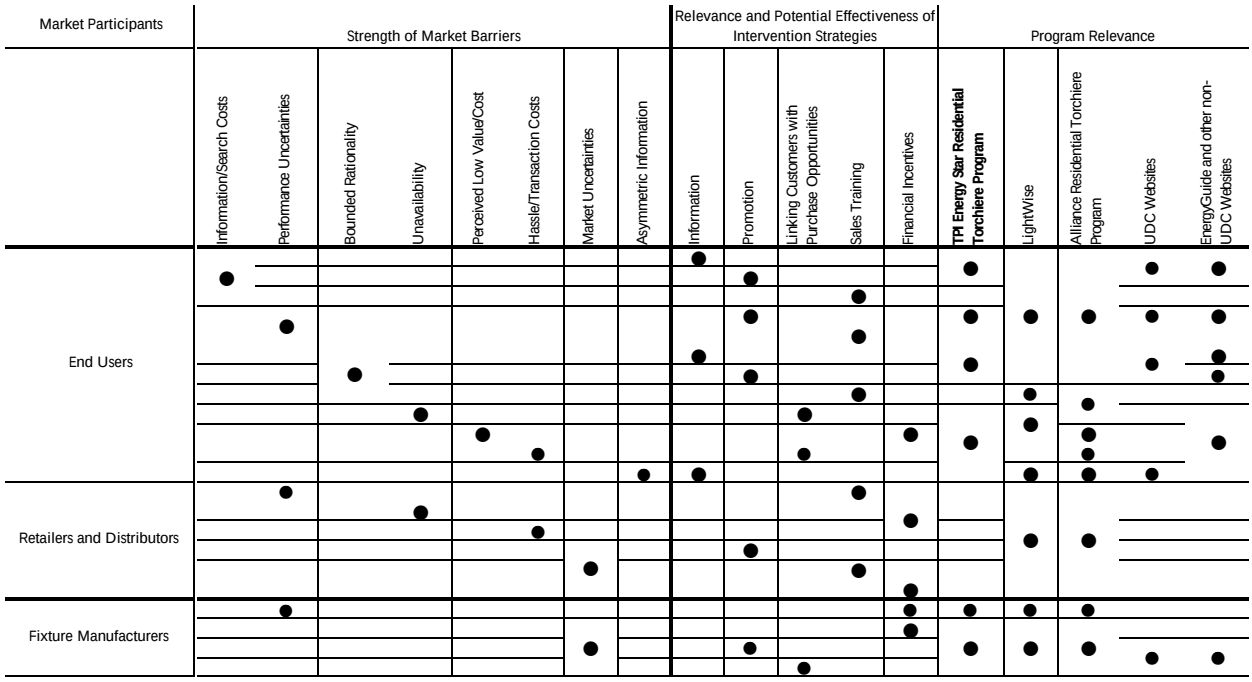
- The program offers information about energy-efficient fluorescent torchieres through an Internet web site, potentially reducing informational barriers. The web site provides information and discussions of product benefits, options, quality, attributes, and prices. Moreover, interested consumers can purchase units over the web, thus reducing hassle and transaction costs for some. (This is not a universal benefit because some consumers may be either unable or unwilling to purchase products directly over the Internet.)

- To increase consumer interest and induce purchases of the energy-efficient units, the sponsor offered the energy-efficient fluorescent torchieres at a discounted price to those served by the administering UDC (PG&E, as determined through the delivery zip code).

- In addition, this project may help to reduce the market uncertainty of manufacturers. To the extent that the project successfully increases the total penetration of energy-efficient fluorescent torchieres without eroding the profits of manufacturer (because of the buydown involved), manufacturers may be able to amortize some of their investments and increase their confidence in the growth of consumer demand for these units.

- This project, however, is not designed to reduce the barriers faced by midstream market actors. Indeed, as discussed below under sustainability, the project may even increase the competition faced by retailers and could slightly increase their market uncertainty.

Exhibit 12-4
ENERGY STAR® Residential Torchiere Market Assessment
Identification of Program Targets



12.5 ENERGY STAR® RESIDENTIAL TORCHIERE ¾ ASSESSMENT OF POTENTIAL EFFECTIVENESS

The TPI Torchiere program addresses end users' information and search costs and performance uncertainties, the most important barriers to successful and efficient market transformation. The interventions used by this program duplicate many of the efforts already in use in the market. Exhibit 12-4 describes how the TPI program and related programs are effective, or ineffective, in reducing market barriers. For example, the LightWise Program, through its provision of *Information,* does a fairly poor job of reducing *Asymmetric Information* for *End Users*.

- The sponsor offers a web site that is available to all consumers with access to the Internet and an understanding of how to find pages that are useful to them. In addition, the sponsor has secured advertising space on several related web sites. Moreover, these advertisements offer links to the sponsor's web site, thus increasing the ways in which consumers can learn about energy-efficient fluorescent torchieres and their benefits, and take advantage of the opportunity to purchase them at a discounted price.

- The sponsor has supplemented web-based advertising with fact sheets and brochures that are distributed heavily in venues likely to attract members of the target audiences, such as university bookstores. In addition, a small number of general circulation newspaper advertisements were bought. However, because of a limited marketing budget, the sponsor was unable to engage in broader paid efforts to increase awareness of the web site and its offerings. The sponsor was unable to use such promotional mechanisms as bill inserts, because of the requirement that TPI-sponsored projects be completely independent of UDC programs.

12.6 ENERGY STAR® RESIDENTIAL TORCHIERE PROGRAM ¾ IMPLEMENTATION EFFECTIVENESS

The program was able to get of the ground without much difficulty. The site was up and running as planned. The project did require some shuffling of funds for marketing expense. The original proposal apparently under estimated the marketing requirements for the project. The UDC project manager felt that these changes were minimal, and responsible.

12.7 ENERGY STAR® RESIDENTIAL TORCHIERE PROGRAM ¾ POTENTIAL FOR SUSTAINABILITY

This project is likely to have sustainable effects only if there are proven incentives for maintaining and promoting the web site. At this time, it seems unlikely that a group of manufacturers or retailers would be motivated to do so. (This is not to say that *individual* manufacturers or retailers might not be willing to promote energy-efficient torchieres, *among their other offerings*.) The project has not been designed to provide either set of market actors with evidence that this additional distribution channel is uniquely profitable.

This project is separate from the sponsor's other efforts, on behalf of California UDCs, to increase the sale of energy-efficient fluorescent torchieres through ordinary retail outlets. (This appears to be an unintended outcome of the requirement that TPI-sponsored projects must be completely independent of the UDCs and their programs.) Accordingly, the web site does not offer information that would allow consumers to find physical samples of efficient units nearby, or to purchase them from cooperating retailers. (However, a moderately facile user of the World Wide Web *could* navigate from the sponsor's site to the EPA site, and from there to EPA's "storefinder" search engine.) In other words, the project may risk cannibalizing some retail sales and may create a perception of competition against retailers. (In contrast, the fluorescent torchiere program in the Pacific Northwest positions the web site option as an alternative designed particularly for consumers who do not have ready access to retail stores.).

It should also be noted that the project design includes a manufacturer buydown, allowing consumers to purchase energy-efficient units at a discounted price. Particularly given the short timeframe of the TPI program, no mechanism is provided for assessing or maintaining consumer interest after the financial incentives are removed.

For these reasons, the sustainability of this initiative seems questionable, even if consumers who use it are satisfied and the market served grows over time. Rather, the value of this niche is likely to be tied directly to that of Internet commerce: it is growing rapidly, but remains very small in comparison to other channels of distribution.

12.8 ENERGY STAR® RESIDENTIAL TORCHIERE PROGRAM ¾ SUMMARY

The TPI funding for this project served as seed money to start a business. Unlike other selected projects, the first costs for the Torchiere project were significant while the variable, once the site is running are relatively insignificant. In this sense this project may be one of the models for future TPI programs. The project met its stated goal of getting off the ground, whether it will succeed on its own will take time to determine.

13. COLLEGE OF ENERGY EFFICIENCY KNOWLEDGE

13.1 COLLEGE OF ENERGY EFFICIENCY KNOWLEDGE ¾ OVERVIEW AND TECHNICAL POTENTIAL

The College of Energy Efficiency Knowledge (CEEK) Program seeks to educate consumers about the benefits of energy efficient products through promotion of the ENERGY STAR® label.

13.1.1 Program Overview

The core component of the CEEK is the Mobile Education Unit (MEU), a motor home outfitted with Energy Star products and information. In addition to brochures and model appliances, the MEU was equipped with computers linked to databases to locate products and calculators to determine the "second price tag." Unlike other educational and informational programs, the MEU delivers energy efficiency education directly to consumers. The program targeted large workplaces and other areas with a potential for high concentration of consumers. In general, the program had a very narrow focus, to take energy efficiency knowledge directly to consumers.

13.1.1 Program's Technical Potential

The technical potential of substituting energy efficient appliances, as denoted by the Energy Star® label, is well known.

- In the California market it is expected that natural turnover will generate annual sales of 750,000 to 1,000,000 units, depending on the specific life cycle of the appliance considered. Early retirement programs will increase the sales volume.

- Current energy-efficient appliances like clothes washers and refrigerators are potentially 70 and 50 percent more efficient, respectively, than 10 year-old models.

- The most likely market effects for educational programs like the MEU are:
  - Increasing the awareness of the benefits of energy efficient appliances among consumers and children, and
  - Making the Energy Star® label synonymous with energy efficient appliances, and getting consumers used to identifying them.

Exhibit 13-1
ENERGY STAR® Appliance Market Assessment
Related Program Identification

Program	Description	Utility Sponsors				Sources
		SCE	SoCalGas	PG&E	SDG&E	
TPI Programs						
College of Energy Efficiency Knowledge	Mobile instructional unit designed to bring energy efficiency knowledge directly to the customer. Program targets the Energy Star label spefically.			●		1998 TPI Proposal
Ongoing and Planned California Programs						
PGE&E, SCE, SDG&E, and SoCalGas Residential Rennovation and Retrofit.	Promotion and facilitation of energy efficient retrofit. Seeks to increase energy efficiencey saturation during time of sale or rennovation. Targets all end-uses.			●		UDC 1999 Advice Filings
PG&E, SCE, SDG&E, and SoCalGas Residential Appliance Program	Seeks to increase the demand and supply of energy efficient appliances, as defined by Energy Star label. Initially, refrigerators, clothes washers, dish washers, and room ACs will be targeted.			●		UDC 1999 Advice Filings
PG&E, SCE, SDG&E, and SoCalGas HVAC Program	Seeks to increase the demand and supply of energy efficient HVAC systems as defined by Energy Star label.			●		UDC 1999 Advice Filings
Previous Utility Initiatives						
SDG&E Energy Star Program	Uses media and training to increase awarenes of the Energy Star label.			●		SDG&E 1998 Advice Filings
SCE Retail Initiative	Targets residential customers and retailers. Primarily looks to increase energy efficiency awareness.	●				SCE 1998 Advice Filings
SCE Residential Appliance Direct Rebate Program	Focuses on energy efficient refrigerators and clothes washers.					SCE 1998 Advice Filings
Other UDC Appliance Programs	Each UDC has had numerous programs targeted at increasing energy efficiency awareness, reducing the perceived high costs, and unavailability aspects of the EE appliance market.	●	●	●	●	Previous UDC Advice Filings
Related Programs (e.g., National efforts)						
Energy Star WEB Site	Offers product information and help in locating the appliances. Also describes the benefits of more efficient appliances through a two price tag framework. The first tag refers to the initial purchase price, the second refers to the operating costs.			●		www.energystar.org
Utility WEB Sites	Simliar to the UDC WEB sites, most utilities provide some information to assist consumers in making energy efficient appliance purchases.					Utility WEB Sites
NEEA, WEC, NEEP and others	Each entity offers a number of progams targeted at increasing energy efficiency awareness through a number of methods, including media , marketing, training, standards, etc. Other programs also provide rebates for EE appliance purchases.					Organization WEB Sites
USDOE EnergyGuide	Provides a standard by which consumers can compar the energy savings of different appliances.					DOE & FTC WEB Sites

13.2 COLLEGE OF ENERGY EFFICIENCY KNOWLEDGE ¾ RELATED PROGRAMS

The CEEK Program presents a unique approach to delivering energy efficiency information to consumers. Numerous programs have targeted energy efficient appliances, as defined by the ENERGY STAR® label, for a number of years. Given the prevalence of energy efficient appliance programs, we have provided only a brief summary of these programs.

- The four UDCs are undertaking statewide initiatives aimed at increasing the saturation of ENERGY STAR® appliances through increased education, cost reduction, identification of product sources, etc.
  - The statewide initiatives are currently covered by four programs: Residential Renovation and Retrofit, Residential Appliance, Lighting and HVAC.
  - In addition to major end uses like HVAC and water heaters, the statewide initiatives cover smaller appliances like home computers, printers, and lights.
  - Previous utility programs bear resemblance to the current programs in the targeted participants, appliances, and interventions. Most of the utilities have had programs leveraging the ENERGY STAR® label for at least 5 years. The focus of these programs has primarily been education and financial incentives.

- The ENERGY STAR® Program provides different vehicles for overcoming barriers to the increased saturation of energy efficient appliances and measures.
  - The ENERGY STAR® web site provides detailed information about all major appliances and some minor appliances. In addition, the site provides a store locator tool, tips for hiring contractors, and an audit tool. Recommendations for increasing energy savings are also provided.
  - The ENERGY STAR® awareness campaign uses a number of tools to increase demand for energy efficient appliances, including public service announcements and partnerships with NGOs, utilities, corporations, and retailers. The campaign promotes the advantages of purchasing energy efficient appliances bearing the ENERGY STAR® label.

- DOE's EnergyGuide helps consumers distinguish between competing claims by providing standardized energy and cost savings estimates. Appliances generally are standardized based on features, capacity and size.

Exhibit 13-2
ENERGY STAR® Appliance Market Assessment
Identification of Market Barriers

Market Participants	Strength of Market Barriers								
	Perceived Low Value/Cost	Information and Search Costs	Asymmetric Information	Performance Uncertainties	Bounded Rationality	Product Availibility	Market Uncertainties	Organizational Practices or Customs	Hassle and Transaction Costs
End Users	●	●	●	●	●	●			
Retailers							●	●	
Manufacturers					●		●	●	●
Manufacturers								●	●

KEY

Importance Level: ● High ● Moderate ● Low

Note: "Importance" for a Market Barrier refers to its strength as a barrier. "Importance" for an Intervention Strategy or a Program refers to its relevance to a barrier and its Potential Effectiveness.

13.3 COLLEGE OF ENERGY EFFICIENCY KNOWLEDGE ¾ MARKET BARRIERS

There are a number of barriers to increased saturation of ENERGY STAR® appliances, ranging from perceived low value/cost to product availability. The barriers associated with each market actor are presented in Exhibit 13-2. As shown in Exhibit 13-2, one of the biggest limitations to increased saturation of energy efficient appliances is the *Perceived Low Value/Cost* ratio by *End Users*. Descriptions of each barrier follow.

- Clearly, end users are the obstacle to increased saturation of energy efficient appliances, mostly because of their perceived low value/cost ratio. Currently, energy efficient appliances cost more than less efficient models, but generally cost less to operate in the long run. End users appear unwilling to make the initial investment for higher future savings.

- Information about the potential benefits and trade offs associated with energy efficient appliances are still not readily available or commonplace, and therefore impose some search costs on individuals. End users who are not well informed about the benefits of energy efficient appliances face asymmetric information barriers, relative to retailers.

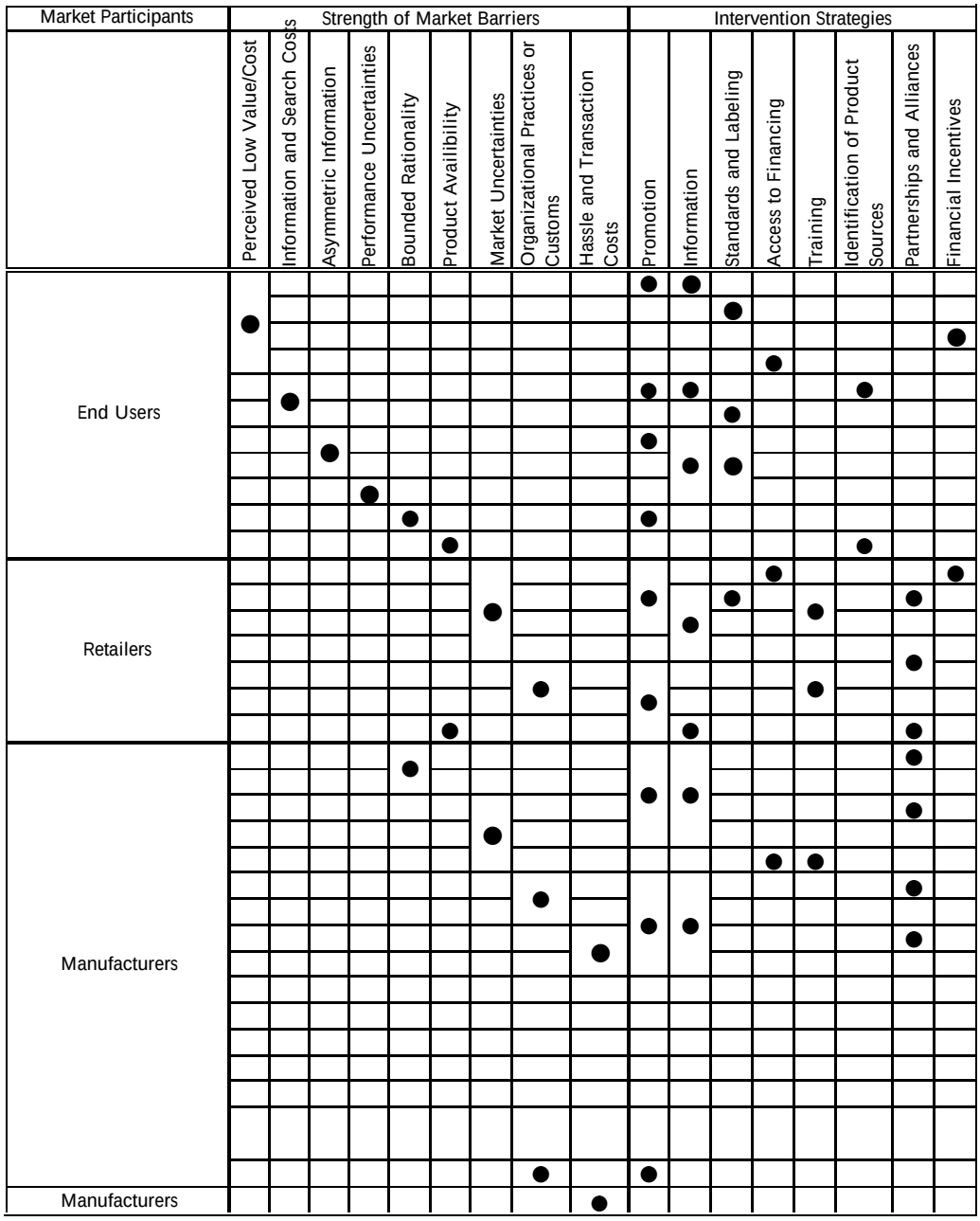
- By purchasing energy efficient appliances, end users risk that the appliances will not provide the savings as advertised, and as such face performance uncertainties.

- Other, less important barriers to end users include: bounded rationality (as they may have a favorite brand or model) and product availability (in areas where the stocking practices present less choice, relative to non-energy efficient appliances).

- Retailers, the next most important market participant, face fewer barriers, but significant market uncertainty could be a limiting obstacle to increased saturation of energy efficient appliances. Facing an uncertain market, retailers may be less likely to give floor space to energy efficient appliances. In addition, retailers may not stock the energy efficient appliances in sufficient quantities to avoid lag times. This will be particularly important for the emergency replacement market.

- Much like retailers, manufacturers face market uncertainty for their new energy efficient products, and therefore may be less likely to invest in their production. In addition to retooling production processes, manufacturers will also have to invest in information materials for their distributors.

Exhibit 13-3
ENERGY STAR® Appliance Market Assessment
Assessing the Potential Effectiveness of Intervention Strategies



KEY

Importance Level: ● High ● Moderate ● Low

Note: "Importance" for a Market Barrier refers to its strength as a barrier. "Importance" for an Intervention Strategy or a Program refers to its relevance to a barrier and its Potential Effectiveness.

13.4 COLLEGE OF ENERGY EFFICIENCY KNOWLEDGE ¾ INTERVENTION STRATEGIES

The TPI CEEK project focused on education and promotion as ways to reduce market barriers for end users. The intervention strategies associated with each market barrier and participant are presented in Exhibit 13-3. The exhibit provides a clear picture of the interaction between barriers and intervention strategies. For example, the *Perceived Low Value/Cost* barrier faced by *End Users* can be reduced through *Information* and *Promotion.* Descriptions of the invention strategies and how they can reduce each market barrier are presented below.

- Financial incentives are a quick, easy and effective way to reduce the perceived low value/cost ratio for end users. By simply reducing the cost of the product, the value/cost ratio should increase and cause the barrier to recede.

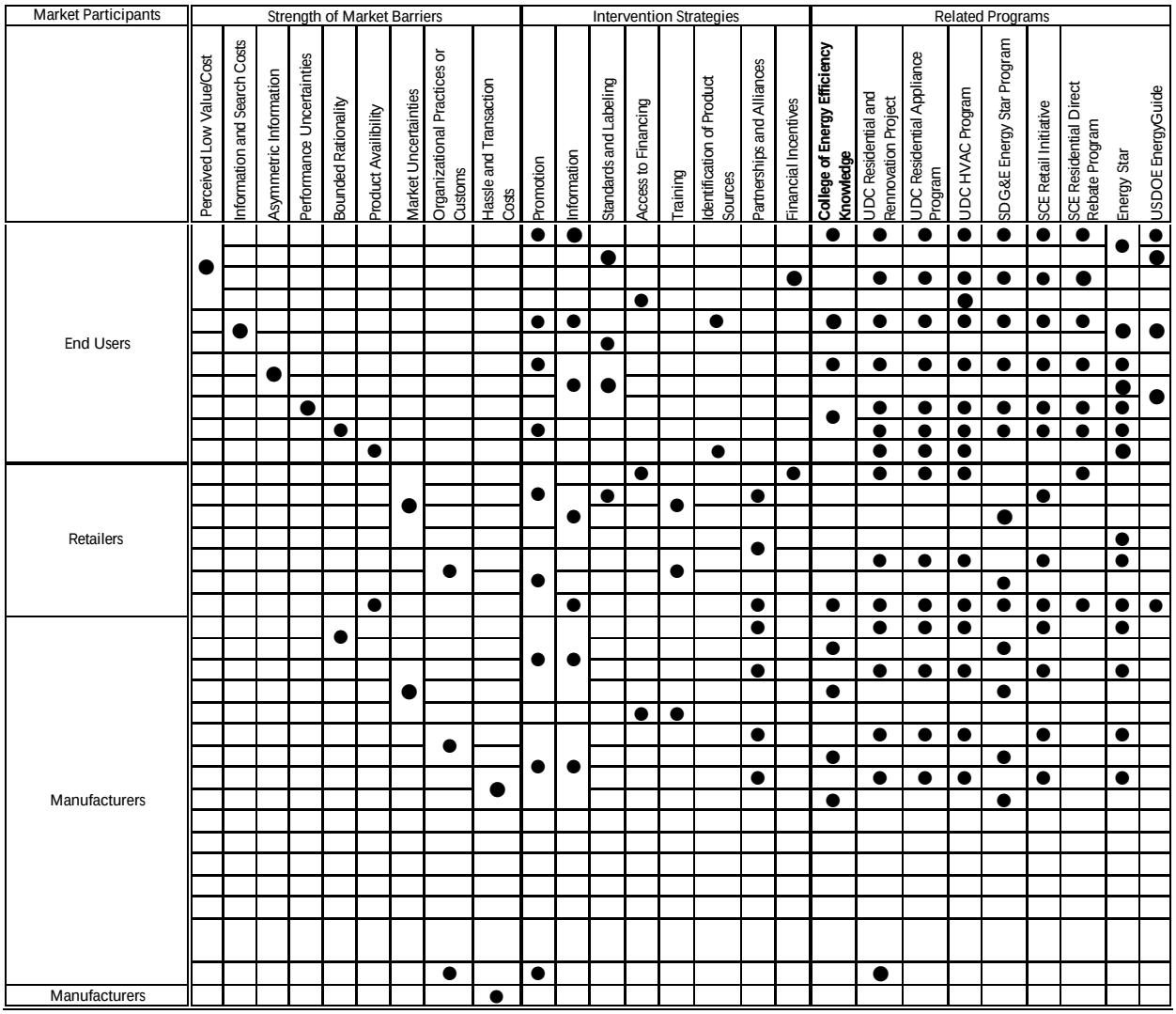
- Information and promotion are alternatives to reducing the low value/cost ratio for end users. Web sites and other information tools can provide detailed appliance-specific information for consumers. Continuing to stress the "second price tag" aspect of energy efficient appliances can also be a powerful tool for increasing energy efficient appliance saturation. Additionally, standards and labeling will make it easier for customers to make the economic tradeoffs associated with energy efficient appliances.

- Asymmetric information and information and search costs barriers can be reduced with similar strategies, namely information, standards and labeling. Easily accessible information, including standards, will make consumers less reliant on retailers and therefore less susceptible to opportunism.

- Promotion campaigns designed to increase end user demand may reduce market uncertainty barriers for retailers. Access to financing and financial incentives in the form of "buy-downs" may further reduce market uncertainties, by spreading risk across more participants.

- Product unavailability will most likely be reduced if manufacturers can be convinced that required plant modifications will be supported by sufficiently large markets. Potential intervention strategies are promotion campaigns and financial incentives targeted at end users. In addition, organization practices and hassle costs are more likely endured if manufacturers are rewarded increased demand for their product.

Exhibit 13-4
ENERGY STAR® Appliance Market Assessment
Identification of Program Targets



KEY

Importance Level: ● High ● Moderate ● Low

Note: "Importance" for a Market Barrier refers to its strength as a barrier. "Importance" for an Intervention Strategy or a Program refers to its relevance to a barrier and its Potential Effectiveness.

13.5 COLLEGE FOR ENERGY EFFICIENCY KNOWLEDGE ¾ ASSESSMENT OF POTENTIAL EFFECTIVENESS

The TPI CEEK Program addresses end users' information and search costs and performance uncertainties, the most important barriers to successful and efficient market transformation. The interventions used by this program are more proactive than previous efforts. Bringing information directly to consumers may be a more effective way of (literally) driving home the benefits of energy efficient appliance purchases. Exhibit 13-4 describes how the CEEK Program and related programs are effective, or ineffective, in reducing market barriers. For example, the CEEK Program, through its *Promotion* and *Information*, were relatively effective in reducing *Perceived Low Value/Costs* barriers for *End Users*. The ability of the TPI and related programs to successfully reduce market barriers is addressed below.

- The CEEK Program uses previously developed resources, but delivers them directly to consumers. In doing so, the program is probably more effective at reducing information barriers than more passive programs. Providing easy access to information should allow consumers to more easily to deflect any opportunism that may arise. According to project sources, consumers found the computers and databases easy to operate, therefore increasing the likelihood that energy efficiency knowledge was transferred.

- The DOE's EnergyGuide probably goes the furthest in reducing opportunism for consumers. Because standardized savings estimates are presented directly on appliances, consumers can make clear distinctions between competing products and competing claims. Better information about first price tag vs. second price tag may provide additional useful information to consumers.

- DOE and EPA's ENERGY STAR® labeling program helps direct consumers to EE appliances by providing a consistent recognizable symbol. Partnerships with utilities and manufacturers will continue to spread interest and awareness in label. The program does appear to lack specific information on the actual savings associated with ENERGY STAR® purchases. More detailed information may be useful to consumers.

13.6 COLLEGE FOR ENERGY EFFICIENCY KNOWLEDGE ¾ IMPLEMENTATION EFFECTIVENESS

In general the project accomplished its modest goals of outfitting the motor home and getting it out on the road for four weeks, according to the project manager. The motor homes driven to numerous sites in the SCE service territory and as planned, provided information on ENERGY STAR® products. The project manager stated that the software/database installed within the MEU was well received by visitors. Furthermore, visitors found the "second price tag" comparison for different appliances useful.

13.7 COLLEGE FOR ENERGY EFFICIENCY KNOWLEDGE ¾ POTENTIAL FOR SUSTAINABILITY

It is too early to determine if this program will have sustainable effects. Specifically, once funding for the program is removed, it unlikely that manufacturers and retailers will pay for the service. In terms of increased awareness of the ENERGY STAR® label there are few programs that could be more effective in delivering energy efficient information – the information is delivered directly to consumers.

Even though the program may not be able to fund itself, it appears to be a useful, and used, resource. Consumers appear to desire more information about energy efficiency, which at times may have been difficult to attain. The MEU solves this problem by delivering it directly in an unbiased format away from the pressures of sales staff. When combined with other programs the CEEK can increase EE knowledge in an effective way. SCE plans to "mainstream" the project by rolling it into its 1999 program planning. Funding for the project will come from multiple programs like lighting, appliances and windows, all of which were represented in the MEU.

13.8 COLLEGE FOR ENERGY EFFICIENCY KNOWLEDGE ¾ SUMMARY

The CEEK project had modest goals which, it effectively accomplished. The project was effective in bringing information directly to end users and was eventually rolled directly into SCE's programs, providing further indication of the project's success.

14. ENERGY SIMULATION SOFTWARE

14.1 ENERGY SIMULATION SOFTWARE ¾ OVERVIEW AND TECHNICAL POTENTIAL

The Third-Party Initiative (TPI) Energy Simulation Software Program attempts to encourage improved energy efficient design of commercial buildings in California by providing software design tools.

14.1.1 Program Overview

The Third-Party Initiative (TPI) Energy Simulation Software Program attempts to encourage improved energy efficient design of commercial buildings in California by making it easier to design buildings which comply with regulatory standards. By providing software design tools to ease fenestration, HVAC, and Title 24 compliant design for new commercial buildings the project sponsors hope to ease compliance "costs". According to the project sponsors, the most likely market effects of this program in California are:

- Increased supply of energy efficient buildings,
- Increased value placed on energy efficiency in new construction, and
- Increased consumer demand for energy efficient buildings.

14.1.2 Program's Technical Potential

Improved energy efficient design in commercial buildings has significant technical potential in California. These improvements are estimated to reduce electricity usage by 25 percent per square foot in all commercial new building. However, designers and builders generally take the least costly, and therefore least efficient, route.[1]

[1] Source: Selecting Targets for New Market Transformation Initiatives; Xenergy; March 1998

Exhibit 14-1
Commercial Building Design Market Assessment
Related Program Identification

Program	Description	Utility Sponsors				Funding ($000)	Sources
		SCE	SoCalGas	PG&E	SDG&E		
TPI Programs							
Energy Simulation Software	Provides software components, including fenestration, HVAC, and Title 24 Code Compliance Wizards to be incorporated into Visual DOE and other modeling interfaces energy design tools for new construction.	●				495	TPI Program Proposal
Ongoing and Planned California Programs							
Commercial New Construction	Provides design and technical assistance and incentives to builders, developers, engineers and architects.	●				5,732	SCE 1999 Advice Filings
Commercial New Construction	Provides design assistance and tools, and incentives to builders, developers, engineers and architects.			●		7,030	PG&E 1999 Advice Filings Update (Has some of the elements from the design assistance program from PY1998) a.k.a. Savings by Design
Commercial New Construction	Provides design and technical assistance and incentives to builders, developers, engineers and architects.				●	2,300	SDG&E 1999 Advice Filings
Previous Utility Initiatives							
Energy Design Resource	Provides energy efficiency information through integrated design publication, design tools (CD-ROM), design competition, training, design briefs, financial packages for developers, and design assistance services.	●				1,000	SCE 1998 Advice Filing
New Construction Design Consultation	Provides architects and builders project-specific energy efficiency information assistance concerning exceeding State minimum energy efficiency requirements early on in the construction process.		●				SoCalGas 1998 Advice Filing
Related Programs (e.g., National efforts)							
Architecture & Energy: Building Excellence in the Northwest	Through an annual awards program, regional workshops and other educational efforts, this program will educate people who design commercial buildings about the value and benefits of energy efficient architecture.						NEEA Website
Green Commercial Building	Provides design, evaluation, and commissioning assistance to the project and communicate experiences and results to the community through a series of workshops.						ECW Website
Daylighting Collaborative	The program will emphasize demonstrations, training, design assistance and education to stimulate demand for daylit buildings as well as professional capability to deliver daylighting services.						ECW Website - This is a combination of the Active Daylighting and the Daylighting (AP-7) Programs
Lighting Design Lab	In cooperation with New York-based Lighting Research Center, promotes energy-efficient lighting for retail, office, daylighting and residential sectors, through a downloadable laboratory.					1,800	NEEA Website

14.2 ENERGY SIMULATION SOFTWARE ¾ RELATED PROGRAMS

Although highly energy efficient design is not standard practice, a number of promotional programs have been administered in California and nationwide. Furthermore, these programs have been informational and design-focused in the efforts to promote this market. Exhibit 14-1 provides a brief description of each of these programs.

The TPI Energy Simulation Software Program differs from most other programs in its concentration on fenestration, HVAC systems, and Title 24 compliance. In general, the other programs provide a whole-building approach.

- Like the TPI program, the Lighting Design Lab, sponsored in part by the Northwest Energy Efficiency Alliance (NEEA), provides a software tool that can be downloaded via the Internet. The tool assists in energy efficient lighting design for both residential and commercial buildings.

- Through the Commercial New Construction Programs, sponsored by SCE, PG&E, and SDG&E in 1999, design assistance and financial incentives for energy efficient building design were provided.

- Previous design assistance programs sponsored by SCE and SoCalGas provided in-person project-specific energy efficiency design consultation. In addition, SCE's program offered CD-ROM tools for architectural, mechanical, and lighting design.

- The Green Commercial Building Program and the Daylighting Collaborative, sponsored by the Energy Center of Wisconsin (ECW), provide education and technical assistance for design professionals, builders, and other community members.

- Unlike other programs, the NEEA's Architecture and Energy: Building Excellence in the Northwest is purely a design competition aimed at promoting awareness and acceptance of energy efficient design by all market actors.

Exhibit 14-2
Commercial Building Design Market Assessment
Identification of Market Barriers

Market Participants	Strength of Market Barriers					
	Split Incentives	Information or Search Costs	Hassle/Transaction Cost	Organizational Customs and Practices	Performance Uncertainties	Bounded Rationality
Design Professionals	●					
		●				
			●			
				●		
					●	
						●
Builders	●					
		●				
			●			
				●		
					●	
						●

KEY

Importance Level
● High
● Moderate
● Low

Note: "Importance" for a Market Barrier refers to its strength as a barrier. "Importance" for an Intervention Strategy or a Program refers to its relevance to a barrier and its Potential Effectiveness.

14.3 ENERGY SIMULATION SOFTWARE ¾ MARKET BARRIERS

Successful energy simulation or design programs may effectively reduce *Split Incentives* and change *Organizational Customs and Practices.* As shown in Exhibit 14.2, *Split Incentives* are the most important barrier facing *Design Professionals* and *Builders*. In this case, neither the design professional nor the builder must actually occupy the building upon its completion, so it is not necessarily in their interest to create the most efficient building. More detailed descriptions of the market barriers follow.

- Information and search costs mainly affect the design professional's entry into the efficient design market. Information about energy efficiency best practices is costly to maintain and update, so these practices are unlikely to be implemented.

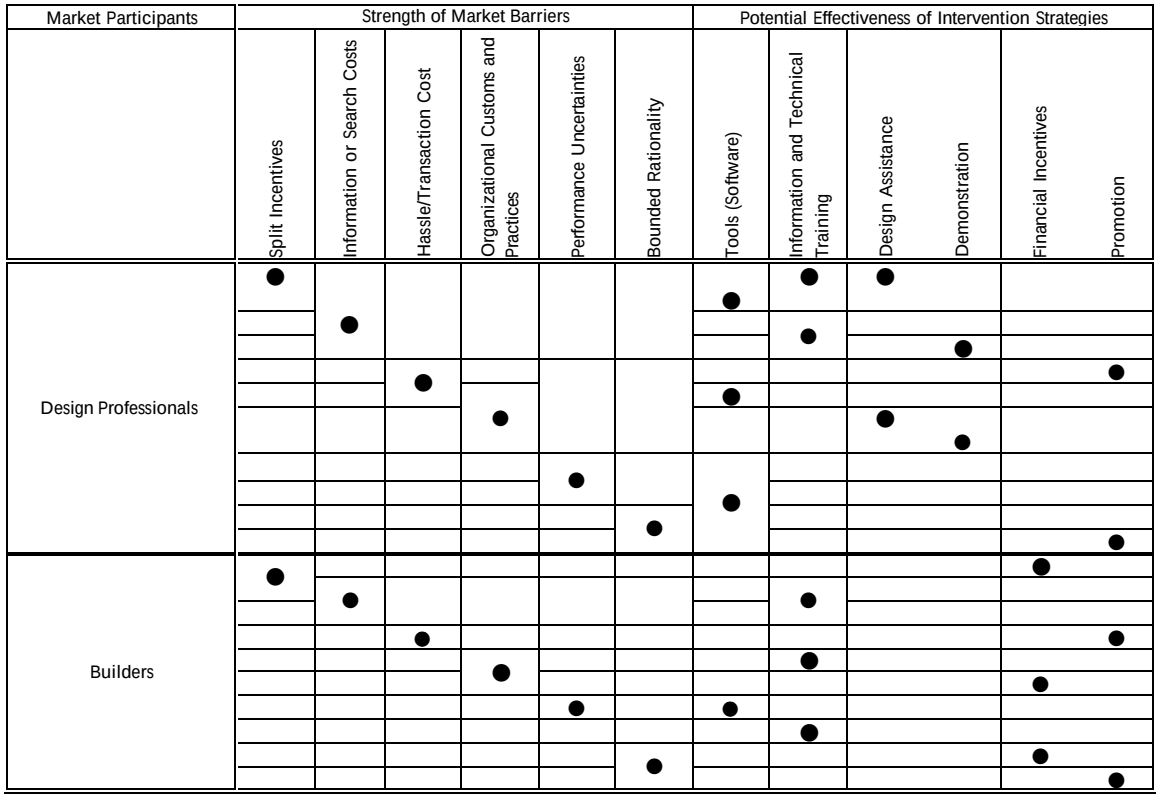
- Information and search costs are lower for builders, as the specification information about appliances is more readily available to them, than the technical information required by design professionals.

- Hassle or transactions costs are a barrier to design professionals as they must continue to change and update their design knowledge. This barrier is less important for builders, as they will likely rely on the designer to ease any design hassles.

- Organizational customs and practices apply to design professionals, but more so to builders. For both these groups, it may be difficult to change the way a firm has been designing or building previously. Related to this barrier is bounded rationality, which reduces the incentive for market participants to change their practices.

- Performance uncertainties held by designers and builders can be attributed to not fully understanding the benefits of energy efficient windows and HVAC systems.

Exhibit 14-3
Commercial Building Design Market Assessment
Assessing the Potential Effectiveness of Intervention Strategies



KEY		
Importance Level	●	High
	●	Moderate
	●	Low

Note: "Importance" for a Market Barrier refers to its strength as a barrier. "Importance" for an Intervention Strategy or a Program refers to its relevance to a barrier and its Potential Effectiveness.

14.4 ENERGY SIMULATION SOFTWARE ¾ INTERVENTION STRATEGIES

The TPI Energy Simulation Software Program selected only one intervention, *Software Tools,* to address barriers faced by *Design Professionals* and *Builders*. Software tools can be effective for reducing *Design Professionals' Information and Search Costs,* as well as *Performance Uncertainties*. When these actors are able to design easily and see the results immediately, they may be more likely to design with energy efficiency in mind. These tools can also be helpful in reducing builders' performance uncertainties as they can see the effects of the design and try different scenarios. The use of other interventions is described below.

- Provision of information and technical training has the potential to reduce split incentives by making it easier for design professionals to see the benefits of energy efficient buildings. It costly to acquire new design information; direct training should reduce the costs of acquisition.

- Technical training aimed at builders can be an important tool in reducing information and search costs and changing organizational practices and customs.

- Design assistance provided to design professionals may reduce split incentive barriers by showing the benefits that accrue to end users. The design assistance also may provide an opportunity for design professionals to try something new, and potentially change their organizational customs and practices.

- Demonstration, generally in the form of design competitions, is moderately important to helping change both design professionals' and builders' organizational customs and practices, by showing that energy efficient designs are acceptable and desirable.

- Financial incentives may be used to help convince builders to use desirable, yet possibly more costly appliances and materials, by reducing the cost of energy efficiency to the builder and therefore providing the incentive required for increased energy efficiency.

- Promotion can be used to significantly reduce information and search costs for both design professionals and builders. When these actors do not have to actively educate themselves about the availability of better designs, they may be more likely to use the information. Promotion may also assist the reduction of bounded rationality by helping introduce new ideas about energy efficient design and building.

Exhibit 14-4
Commercial Building Design Market Assessment
Identification of Program Targets

Market Participants	Strength of Market Barriers						Potential Effectiveness of Intervention Strategies						Program Targets							
	Split Incentives	Information or Search Costs	Hassle/Transaction Cost	Organizational Customs and Practices	Performance Uncertainties	Bounded Rationality	Tools (Software)	Information and Technical Training	Design Assistance	Demonstration	Financial Incentives	Promotion	**TPI Energy Simulation Software**	Lighting Design Lab	Energy Design Resource	Commercial New Construction	New Construction Design Consultation	Green Commercial Building	Daylighting Collaborative	Architecture & Energy: Building Excellence in the Northwest
Design Professionals	●							●	●						●					
		●					●						●	●						
								●							●					
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Builders	●										●				●	●				
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KEY

Importance Level
- ● High
- ● Moderate
- ● Low

Note: "Importance" for a Market Barrier refers to its strength as a barrier. "Importance" for an Intervention Strategy or a Program refers to its relevance to a barrier and its Potential Effectiveness.

14.5 ENERGY SIMULATION SOFTWARE ¾ ASSESSMENT OF POTENTIAL EFFECTIVENESS

The TPI Energy Simulation Software Program addresses performance uncertainties, information and search costs, and organizational practices and customs. This program was designed to increase the supply of energy efficient commercial buildings in California by reducing some of the costs associated with designing and constructing these buildings. In an effort to achieve these market effects, the program concentrated its work on providing design professionals with software components to reduce performance uncertainties.

Exhibit 14-4 describes how the TPI program and related programs are effective, or ineffective, in reducing market barriers. For example, the *Energy Design Resource* Program, by providing *Design Assistance* and *Information and Technical Training,* was relatively effective in reducing *Split Incentives* for *Design Professionals*. The ability of the TPI and related programs to successfully reduce market barriers is addressed below.

- The Lighting Design Lab is most like the TPI Energy Simulation Software, as it uses the same interventions to address the same market actors and barriers. This program has the potential to make a sustainable shift in demand from design professionals who use computer-drafting tools for lighting.

- The Energy Design Resource Program is only moderately effective in its use of software tools and design assistance. Since the program uses considerable one-on-one consulting with design professionals, it is unlikely that this program will be able to produce a sustainable change in the world of building design.

- The Commercial New Construction Program, along with the Daylighting Collaborative and the Building Excellence in the Northwest, use financial incentives to reduce split incentives, and technical training to address information and search costs and organizational customs and practices. These programs will likely be effective in increasing the number of energy efficient buildings in the short term. Because they use financial incentives, however, it is unlikely that this shift will continue after the programs end.

- The New Construction Design Program, previously sponsored by SoCalGas, offered design assistance to designers and builders early on in the construction process. Since the timing of this intervention might sometimes be too late to implement energy efficient design, the effectiveness of this program in transforming the entire market is questionable.

- The Green Commercial Building Program was moderately effective in addressing builders' needs with information and advertising. To make a sustainable shift, however, the program information must reach a large group of designers and builders. In addition, the cost of "green" building and designing must be similar to current practices. It's unlikely that this program alone could increase supply or demand of higher efficiency buildings in a sustainable manner.

14.6 ENERGY SIMULATION SOFTWARE ¾ POTENTIAL FOR SUSTAINABILITY

This section evaluates how well the TPI Energy Simulation Software Program met its goal, which was to increase the supply of and the demand for more energy-efficient commercial buildings. This program should not be considered innovative, as the concepts (and possibly the contents) of its software tool is similar to existing design tools. Currently this project is still in its development phase, therefore any indication of sustainability is theoretical.

- It is possible that SCE chose this program to replace the CD-ROM tools provided through its Design Assistance Program from the 1998 program year.

- Unless the cost of energy efficient building design becomes the same as (or lower than) more standard designs, this program will not be able to make a sustainable market shift with builders. A market shift may be possible, however, if design professionals accept these designs as general practice.

14.7 ENERGY SIMULATION SOFTWARE ¾ IMPLEMENTATION EFFECTIVENESS

Due to issues related to intellectual property, this project was granted an extension and did not begin until much later. At this time the software is still in its testing phase, therefore making it difficult to assess whether the project was successful or not.

14.8 ENERGY SIMULATION SOFTWARE ¾ SUMMARY

TPI Energy Simulation Software Program is an attempt to make it easier for design professional to produce energy efficient buildings. The software makes it easier to comply with standards and codes, and to see the effect of any changes on the building's energy efficiency. Whether the software will be used by professionals is impossible to tell at this stage given that it has not been released.

15. LEAP

15.1 LEAP ¾ OVERVIEW AND TECHNICAL POTENTIAL

The Local Energy Assistance Program (LEAP) is designed to bring considerations of energy efficiency into the planning and approval process at the local level.

15.1.1 Program Overview

LEAP represents an attempt to use an alternative vector, local governments, to increase energy efficiency awareness and implementation. The program was funded by three of the four UDCs and is implemented through a single association of local governments that works with individual counties and towns. Standard practice for most communities is still the development of sprawling, treeless residential and commercial subdivisions, indicating that significant potential exists to improve local planning practices in California. A description of the market and its technical potential is presented below.

- LEAP seeks to work with local governments — and, by extension, with developers — to improve the energy efficiency of development by institutionalizing its consideration in the local government development planning process. Intervening in this upstream aspect of the new construction market should enable the program to capture opportunities for energy efficiency that would otherwise be foreclosed by decisions made during the planning process. LEAP is funded by three of the utilities participating in the TPI program, with all but SDG&E contributing to the program's $1.2 million annual budget. It is being implemented by the Local Government Commission (LGC) and ADM Associates.

- LEAP uses a multi-faceted approach to help California cities and counties improve energy efficiency, including:
  - Free consulting services to analyze development plans, public works standards, and other plans and ordinances.
  - Provision of guidelines for energy efficiency-related ordinances and standards that cover, for example, street design, solar access, and tree siting.
  - Energy audits of municipal facilities.

- The anticipated market effects goals of this program in California are:
  - To influence the local government approval process so that energy efficiency is an institutionalized consideration, both directly in the assisted communities and by example in other communities who observe the results of the program.
  - To make both the process of conducting energy audits of municipal facilities and the use of results in implementing energy efficiency improvements routine.
  - To encourage developers who participate in or observe the program to voluntarily adopt more energy efficient construction practices.

15.1.2 Program's Technical Potential

While the practices and policies that are expected to result from the program are more difficult to quantify than standard energy efficiency measure (EEM) impacts, research and case studies suggest significant technical potential exist to improve consideration of energy efficiency in planning in California.

- In the San Joaquin Valley, reducing street widths and planting trees is estimated to have the potential to reduce ambient temperatures by as much as 10 degrees on a hot summer day and cut annual residential cooling bills by 16-17 percent.[1]

- Systematic inclusion of energy efficiency considerations in the planning process, together with improved code enforcement, can lead to an average efficiency of newly constructed homes that exceeds Title 24 by more than 10 percent.[2]

- Similarly, savings from increasing the number of homes in a development with a North-South orientation are estimated at 5-10 percent of anticipated heating and cooling energy usage.

[1] Source: Burden, D., Street Design Guidelines for Healthy Neighborhoods, Local Governments Commission, 1998

[2] Currents newsletter distributed by LGC, 1998.

Exhibit 15-1
Energy Efficiency In Local Planning Market Assessment
Related Program Identification

Program	Description	Utility Sponsors				Funding ($000)	Sources
		SCE	SoCalGas	PG&E	SDG&E		
TPI Programs							
Local Energy Assistance Program (LEAP)	Energy planning assistance to local governments served by PG&E, SCE and SoCalGas.	●	●	●		1,200	1998 LEAP Proposals
Ongoing and Planned California Programs							
New Construction Codes and Standards Support and Local Government Initiatives	Two program elements: 1) support effective implementation of energy efficiency codes and standards, 2) community-based market transformation initiatives.	●				971total (171 for #1, 800 for #2)	SCE Advice Filing, 10/98
New Construction Codes and Standards Support and Local Government Initiatives	Two program elements: 1) support effective implementation of energy efficiency codes and standards, 2) community-based market transformation initiatives.		●			600 total (100 for #1, 500 for #2)	SoCalGas Advice Filing, 11/98
New Construction Codes and Standards Support and Local Government Initiatives	Two program elements: 1) support effective implementation and upgrades of energy efficiency codes and standards, 2) local government initiatives.			●		1,201 total (951 for #1, 250 for #2)	PG&E Advice Filing, 11/98
California Energy Commission Energy Partnership Program	Helps cities and counties reduce energy use in government buildings. An initial free feasibility study identifies possible energy efficiency projects.						www.energy.ca.gov/efficiency/partnership
League of CA Cities and CA State Association of Counties	Offers its members lease financing for EE projects in all utility service territories.						Currents newsletter, Jan 1999
Previous Utility Initiatives							
SCE Local Government Energy Efficiency Awareness Program	Support start-up of Community Energy Authority; assist in performing energy efficiency analysis, design, and implementation services.	●				1,000	1998 Program Plans 10/1/97
Related Programs (e.g., National efforts)							
Northwest Energy Efficiency Alliance Local Government Associations Program	Alliance of local government organizations in four states to promote energy efficient market transformation efforts, including building operator certification and energy code support.					664 thru 7/2000	NEEA web site: nwalliance.org
International Council for Local Environmental Initiatives	Provides publications on steps that local governments can take to improve energy efficiency in existing buildings and planning.						Currents newsletter, Jan 1999
US Green Buildings Council, State and Local Green Building Initiatives Committee	In addition to serving as a for for information transfer, will provide a tool kit to cities/states to facilitate green building programs.						www.usgbc.org
DOE Energy Efficiency and Renewable Energy Network	Provides information on how cities and counties are putting energy efficiency and alternativate energy into practice.						www.eren.doe.gov/cities_counties/
DOE Rebuild America	Voluntary program that helps community partnerships make profitable investments in existing buildings through energy-efficient technologies.						DOE and state websites.

15.2 LEAP ¾ RELATED PROGRAMS

LEAP adds to an existing mix of informational programs a more focused, hands-on approach to systematically estimating energy savings from alternative development designs. Exhibit 15-1 presents an overview of related utility programs, as well as programs from other areas of the country.

- Based on the advice filings of SCE, SoCalGas and PG&E, the utilities have earmarked $1.55 million for local market transformation initiatives (and approximately $1.2 million for code enforcement) for 1999. Most of the $1.55 million total is likely to be used to fund the continuation of LEAP. The LGC, in its first quarter '99 newsletter, indicated that continued funding had been applied for and that an effort would be made to extend the program to SDG&E's service territory.

- Within California, there have been a number of efforts to improve energy efficiency at the local level. Examples include:
  - The City and County of San Francisco passed an energy conservation retrofit ordinance that resulted in 40,000 housing units being retrofitted over an eight-year period, with an estimated 10 percent reduction in energy use.
  - The California Energy Commission (CEC) Energy Partnership Program helps cities and counties reduce energy use in government buildings by providing general information as well as free initial feasibility studies for energy efficiency projects.
  - The League of California Cities and California State Association of Counties promotes energy efficiency by offering its members lease financing for energy efficiency projects.
  - In addition, numerous local governments have, of course, participated in incentive-based programs of all kinds offered by utilities in the past.

- In another regional effort, the Northwest Energy Efficiency Alliance (NEEA) is promoting an alliance of local government organizations in the four-state area covered by the NEEA to promote energy efficient market transformation efforts such as its WashWise, BacGen efficient wastewater treatment, and Commissioning in Public Buildings programs.

- There are also a number of national (and even international) initiatives to demonstrate to local governments that a departure from standard planning practices could foster the development of more "livable" energy efficient communities. Examples include:
  - The International Council for Local Environmental Initiatives provides information that local governments can take to improve energy efficiency in existing buildings and in their planning process.
  - The US Green Buildings Council, a public-private alliance of architects, manufacturers, and government organizations, serves as a forum for information exchange.
  - DOE not only provides information to local governments through its Energy Efficiency and Renewable Energy Network (EREN), it also provides information and other assistance through Rebuild America.

Exhibit 15-2
Energy Efficiency in Local Planning Market Assessment
Identification of Market Barriers

Market Participants	Strength of Market Barriers								
	Organizational Practices	Info/Search Costs (lack of knowledge)	Performance Uncertainty	Market Uncertainty	Split/misplaced incentives	Asymmetric Information	Hassle/Transaction Cost	Bounded Rationality	Access to Financing
Local Governments	●								
		●							
			●						
				●					
						●			
							●		
								●	
									●
Builders/developers	●								
				●					
					●				
							●		
						●			
								●	
Community (voters, business interests, etc.)		●							
			●						
						●			

KEY

Importance Level
- ● High
- ● Moderate
- ● Low

"Importance" for a Market Barrier refers to its strength as a barrier. "Importance" for an Intervention Strategy or a Program refers to its relevance to a barrier and its potential effectiveness.

15.3 LEAP ¾ MARKET BARRIERS

For LEAP to be successful, it must effectively influence both government planners and developers, overcoming barriers on both sides of the table in the process. Many of the barriers to energy efficiency in local development planning have their basis in the standard practices that have evolved over decades. A primary barrier to developing energy efficient communities is *Organizational Practices*, or the business-as-usual development pattern of wide streets and lack of regard for orientation, landscape practices, drainage patterns, and housing design –- a pattern that is rarely challenged during the planning process.

The barriers associated with each market participant are presented in Exhibit 15-2. Descriptions of and reasons for each barrier are presented below.

- Because local government planning is essentially a political process determined by community consensus, any changes in that process to incorporate energy efficiency must be acceptable to all stakeholders. Organizational practices and the "costs" of acquiring information to overcome the inertia associated with those practices are among the most prominent barriers.
    - Both elected officials and planners face a performance uncertainty barrier in considering energy efficient planning. They face a major risk if they grant a developer concessions in anticipation of future energy savings or livability dividends and those benefits don't materialize. Moreover, some of the benefits of energy efficient planning may be difficult to quantify for explicit consideration in the planning process.
    - In addition, because it is a political process, planning involves reconciling the interests of various constituencies: from a business community that worries about the effects on overall economic growth and retail sales to environmental activists. Market uncertainty in terms of acceptance by the broader community is therefore an important barrier to energy efficient planning.
    - The typical planning process casts developers and planners in an adversarial relationship. Since each side views claims made by the other regarding changes in the process with suspicion, asymmetric information is, therefore, a significant barrier.
    - Information and search costs also act as a barrier; even given a certain acceptance of and interest in energy efficient planning, local knowledge of specific techniques and practices is limited and requires extensive and costly information gathering.
    - Even when information can be found and evaluated, incorporating energy efficient options into development planning inherently makes the process more time consuming and complex. The transaction costs associated with energy efficient planning also constitute a potential barrier, especially if standard planning tools are unsuited to the task of analyzing the effects of changes in design.
    - Bounded rationality is a barrier, in that there is a tendency for local planning agencies and developers alike to use "rule-of-thumb" decision making.

Developers, for example, will seek to maximize house size at the expense of more carefully thought out siting and design.

- Governments also face standard practice and information search cost barriers in adopting energy efficiency measures in their own facilities. Access to financing may also be a barrier to the adoption of such measures.

- In addition to the barriers of market uncertainty and asymmetric information described above, developers face a split-incentive barrier, in that developers who invest in energy efficient neighborhood and housing designs may not be able to recover their extra costs, while the ultimate home buyers who will reap the benefits of lower energy usage and an improved living environment rarely participate directly in the planning process.

- As the ultimate decision-makers in local government planning, voters (both as individuals and as members of identified political interest groups) are also market actors whose role must be considered.
  - For voters, significant barriers to supporting changes in the way plans are developed and implemented include information/search costs and performance uncertainty, for the reasons described above.
  - Asymmetric information is also a barrier for this group, in that community members typically lack access to the detailed information and planning tools that are used to justify, for example, concessions or other special considerations for builders who adopt more efficient designs.

Exhibit 15-3
Energy Efficiency in Local Planning Market Assessment
Assessing the Potential Effectiveness of Intervention Strategies

Market Participants	Strength of Market Barriers								Potential Effectiveness of Intervention Strategies							
	Organizational Practices	Info/Search Costs (lack of knowledge)	Performance Uncertainty	Market Uncertainty	Split/misplaced incentives	Asymmetric Information	Hassle/Transaction Cost	Bounded Rationality	Access to Financing	Planning Protocols and standards	Tech. Assistance/ Software tools	Nonfinancial Incentives (e.g., simplified system approval)	Information	Promotion	Case Studies, Demos	Alliance Building	Financing
Local Governments	●									●							
		●									●		●				
			●														
				●										●			
						●										●	
							●			●							
								●							●		
									●								●
Builders/developers	●										●						
				●									●				
					●							●					
							●										
						●										●	
								●			●						
Community (voters, business interests, etc.)		●											●				
			●											●			
						●										●	

KEY

Importance Level
- ● High
- ● Moderate
- ● Low

"Importance" for a Market Barrier refers to its strength as a barrier. "Importance" for an Intervention Strategy or a Program refers to its relevance to a barrier and its potential effectiveness.

15.4 LEAP ¾ INTERVENTION STRATEGIES

Possible intervention strategies to encourage more energy efficient planning range from information for elected officials regarding the benefits of energy efficient planning to hands-on consulting in helping planners evaluate the costs and returns of alternative development configurations. Exhibit 15-3 provides a picture of how each intervention strategy maps to each market barrier.

- To help make energy efficient planning standard practice, interventions should be targeted to two distinct audiences within local governments.
  - Elected officials are influenced by political concerns ranging from budgets to the views of powerful local interest groups who may or may not have an interest in supporting energy efficient planning. For these officials, promotion and alliance building can be used to address such key barriers to political support for efficient planning as asymmetric information and market uncertainty.
  - Local government staff, on the other hand, are likely to be receptive to energy conscious development planning but may lack the information and tools needed to implement new policies. Practical technical assistance, such as software tools and model ordinances, would be appropriate to help this group overcome barriers of organizational practices, information and search costs, and performance uncertainty.

- Information, especially in the form of case studies, can be used to demonstrate that energy efficient planning efforts yield buildings and neighborhoods that are popular with buyers and contribute to the economic success of the city or county, thereby helping to overcome the bounded rationality barrier that keeps planners and builders from considering the full range of design options.

- Because local governments do not compete directly with one another, it is easier to facilitate the development of alliances and the exchange of information between the staffs of different counties and municipalities than it is in the private sector. As a result, successes achieved in one city or county are more readily transferred to others, making it easier to overcome asymmetric information barriers.

- For developers, the split incentives barrier can be addressed by having governments provide either financial or non-financial incentives for energy efficient designs. Rather than direct financial payments, these incentives could take the form of a higher allowed density, reduced taxes or other fees, or a “fast-track” approval process.

- Like other market actors, builders / developers need to be provided with information to convince them that projects built to energy efficient plans will, in fact, be salable.

Exhibit 15-4
Energy Efficiency in Local Planning Market Assessment
Identification of Program Targets

Market Participants	Strength of Market Barriers									Potential Effectiveness of Intervention Strategies										Program Targets										
	Organizational Practices	Info/Search Costs (lack of knowledge)	Performance Uncertainty	Market Uncertainty	Split/misplaced incentives	Asymmetric Information	Hassle/Transaction Cost	Bounded Rationality	Access to Financing	Planning Protocols and standards	Tech. Assistance/ Software tools	Nonfinancial Incentives (e.g., simplified system approval)	Information	Promotion	Case Studies, Demos	Alliance Building	Financing	LEAP	Codes/Standards Support and Local Govt. initiatives	CEC Energy Partnership Program	League of CA Cities and CA Ass'n. of Counties	SCE Local Govt. EE Awareness Pgm.	NEEA Local Govt. Associations	Int'l Council for Local Environmental Initiatives	US Green Buildings Council	Energy Efficiency and Renewable Energy Network	Rebuild America
Local Governments	●									●												●								
		●									●		●					●	●	●			●	●	●	●	●			
			●																			●								
				●										●									●							
						●										●							●							●
							●			●												●							
								●							●			●	●									●	●
									●								●				●								
Builders/developers	●										●																		
				●									●					●	●						●	●				
					●							●																	●	
						●	●									●													●
								●			●							●	●										
Community (voters, business interests, etc.)		●											●					●	●										●
			●											●													●		
						●										●							●						

KEY

Importance Level
- ● High
- ● Moderate
- ● Low

"Importance" for a Market Barrier refers to its strength as a barrier. "Importance" for an Intervention Strategy or a Program refers to its relevance to a barrier and its potential effectiveness.

15.5 LEAP ¾ ASSESSMENT OF POTENTIAL EFFECTIVENESS

In supporting locally tailored energy efficiency solutions, LEAP appears to offer an innovative approach to addressing market barriers that goes beyond the various information-based programs including local governments in their target audience. Exhibit 15-4 describes how the TPI program and related programs are effective, or ineffective, in reducing market barriers. For example, the *CEC Energy Partnership* Program, through its provision of *Information* and *Technical Assistance and Software Tools,* was relatively effective in reducing *Information and Search Costs (lack of knowledge)* for *Local Governments*. The ability of the TPI and related programs to successfully reduce market barriers is addressed below.

- The approach used by LEAP builds on a variety of previous national and state-wide initiatives, but focuses more directly on the local planning process. It appears to break new ground by helping local government use planning tools that quantify the benefits of more efficient design so that both the community and the builder can reap its benefits.

- The Community-based Market Transformation Initiatives element set forth in the advice filings of SCE, SoCalGas, and PG&E appears to reflect a continuation of LEAP. These programs are therefore assumed to have essentially the same market interventions as shown for LEAP.

- In its November 1997 program filing, SCE proposed a local government initiative that appears to share many of LEAP's characteristics, including the institutionalization of energy efficient planning, in this case through the use of Local Energy Authorities.

- The local government commission (LGC), which is delivering the program, existed before LEAP, and already included energy in its broadly defined mandate of assisting member localities in a variety of issues. Specifically,
  - LGC has worked with the California Energy Commission to make information regarding the CEC Energy Partnership Program and other initiatives known to its members.
  - While the LGC's Currents newsletter is a direct result of the program, LGC previously published a variety of newsletters and reports on sustainable development, livability, and other topics related to energy efficiency.

- Several other programs in California rely primarily on the dissemination of information and case studies to support local governments in their efforts to improve energy efficiency in planning.
  - The CEC Energy Partnership Program offers more specific information, in that it provides initial feasibility studies for energy efficiency projects at no cost.
  - At least one of these programs, offered by the League of California Cities and the California Association of Counties, offers access to financing, which is not included in LEAP or any of the other programs reviewed.

- LEAP also shares some characteristics with the Local Government Association (LGA) Support Project of the Northwest Energy Efficiency Alliance (NEEA); both programs employ alliance-building and information sharing as strategies to support market transformation. The NEEA project is, however, smaller in scope and has less of a direct technical support component to develop new planning tools.

- Several national programs also focus on the dissemination of information.
  - DOE's Rebuild America Program, a broad-based national infrastructure improvement program, has been a useful tool in developing alliances and disseminating information on how state and local government can help incorporate energy efficiency into existing buildings.
  - Similarly, DOE's Energy Efficiency and Renewable Energy Network provides publications and web-based information demonstrating how other local governments have succeeded in making their planning process more receptive to energy efficiency.
  - The U.S. Green Buildings Council makes information and planning tools available. As a joint public-private initiative, it may have better potential to address the market uncertainty concerns of private sector participants in the planning process (both builders and other political business groups).
  - The International Council for Local Environmental Initiatives disseminates information on how local governments have implemented energy efficient and other "green" projects.

15.6 LEAP ¾ IMPLEMENTATION EFFECTIVENESS

The LEAP program was implemented by two UDCs, PG&E and SoCalGas. UDC project managers felt the program was simple, straightforward, and had very few pieces – go to government agency and talk to them about energy efficiency. In general the sponsors targeted planning staff at each local government, offering planning assistance, if needed. In the case of PG&E, the project included tree planting activities and encouragement to widen streets.

The project was successful in gaining the ear of local government potential through presentations, and generally pushing energy efficiency information. In some cases the project managers felt the program provided reinforcement of the energy efficiency concepts. The project was also successfully planted tress in a number of communities. One project manager did mention that consumers seemed to be left out of the equation, and should be included in future projects like LEAP. Whether broadening the project's scope will lead to success is unknown. An additional twist to the project, mentioned by a project manager, was to fast track projects that included more energy efficient measures, relative to those that did not.

15.7 LEAP ¾ POTENTIAL FOR SUSTAINABILITY

Because it provides information and tools that allow local governments to fundamentally alter the way energy efficiency is considered in the planning process, LEAP has the potential for sustained effects on the market. The likelihood of sustained market effects would, of course, be increased by the program's continuation.

- The most likely short-term market effects of this program in California are:
  - Increased awareness of the benefits achieved by other localities that succeeded in planning and implementing projects that are more energy efficient and attractive to buyers and the overall community.
  - Greater knowledge of specific tools available for incorporating energy efficiency in the planning process, including software and other planning tools, model ordinances, and mechanisms for rewarding developers who incorporate energy efficient designs into their plans.
  - Awareness, as a result of audits, of energy saving opportunities in local government buildings and, in some cases, action on that awareness to implement specific energy efficiency measures.
- Since it is unrealistic to expect fundamental changes in the way local governments conduct their processes in the one-year time frame of the TPI-funded LEAP, the extent to which the market effects described above are sustained will depend on whether the program is continued.
  - It should be noted that LEAP appears to be addressing many of the critical barriers to energy efficiency in the planning process, and that it has already been able to demonstrate several successes.
  - If the program continues and more of the developments that result from these plans are shown to be market successes, making money for the builder as well as

the town, the likelihood is good that more communities will permanently change their planning process.

15.8 LEAP ¾ SUMMARY

As stated earlier, measuring the impact of a program like LEAP can be difficult, making any determination of success or failure difficult as well. LEAP was able to spread energy efficiency knowledge, and plant trees in a number of communities. Whether these activities will have lasting effects is difficult to say at this point.

16. ENERGY MANAGEMENT SYSTEMS

16.1 ENERGY MANAGEMENT SYSTEMS ¾ OVERVIEW AND TECHNICAL POTENTIAL

The Energy Management System Third Party (EMS^{3p}) Program is designed to increase the awareness of retro-commissioning commercial buildings.

16.1.1 Program Overview

The EMS^{3p} Program is a relatively modest effort to address a major source of potential energy savings: the gap between current practice and the state of the art in Energy Management System (EMS) engineering and operation. A description of the market and its technical potential are presented below.

- The EMS^{3P} Program seeks to close the gap between the actual and potential use of EMSs by promoting and facilitating the re-commissioning of existing EMS installations.[1] The program uses a two-pronged approach:
  - A training and education program was designed for building owners, building operators, engineering firms, and EMS vendors to increase awareness and create a pool of knowledgeable players to promote the development of a self-sustaining market in building re-commissioning.
  - Site-specific assistance will be provided to re-commission up to 20 buildings, with program funds used to defray part of the re-commissioning cost.
- The anticipated market effects of this program in California are:
  - The development of a pool of "educated consumers" – building owners who recognize the need for and the benefits of improved EMS operation – to build increased demand for EMS commissioning services.
  - Encouragement to engineering design firms to offer more comprehensive EMS design services, especially to those building owners who have been educated by the program.
  - An increase in the level of expertise among management companies and other building operators that will enable them to better utilize existing EMS systems and to serve as informed advocates for EMS re-commissioning to building owners.
  - Assuming re-commissioning of 20 "typical" sites, direct savings of 840 kW, 4,480 MWh and 16,800 therms per year.

[1] Re-commissioning is defined here as the systematic adjustment and tuning up of previously installed energy management systems. Strictly speaking, the program promotes retro-commissioning, since these EMSs were probably not formally commissioned when first installed.

- Several components of the program, notably training and the provision of EMS commissioning templates, are designed to lead to longer-term benefits that will persist after the program ends.

16.1.2 Program's Technical Potential

The high degree of technical potential for building re-commissioning, both in California and nationwide, provides an indication of the extent of the gap between this potential and current practice.

- In a recent PG&E study of DSM Potential, re-commissioning of existing commercial buildings was shown to have high energy savings potential, with potential savings of 967 GWh and 1 Tbtu in 2010 for PG&E's service territory.[2]

- Nationally, an ACEEE study ranked re-commissioning of existing buildings first on a list of measures, with estimated national energy savings of 59.7 TWh.[3]

- Turner, et al. note that the first-year cost of "continuous commissioning" will generally range from 15 cents to 40 cents per square foot, depending on the complexity of the building and the availability of good metered data. Energy use is reduced by 15-20% as a result.[4]

- Hicks, in Energy Performance Benchmarking as a Commissioning Tool, found that a commissioning cost of $0.18/sqft for an existing 200,000 sqft building would be expected to yield annual savings of $63,000 for an energy intensive building, $32,000 for a moderately efficient building.

[2] Source: PG&E DSM Potential Study Volume 1: Selecting Targets for New Market Transformation Initiatives, July 1997

[3] Source: ACEEE Selecting Targets for Market Transformation Programs: A National Analysis, August 1998

[4] Source: Turner et al., The Continuous Commissioning Process and Rebuild America, 1998 National Conference on Building Commissioning

Exhibit 16-1
Re-Commissioning Market Assessment
Related Program Identification

Program	Utility Sponsors				Funding ($000)*	Comments
	SCE	SoCalGas	PG&E	SDG&E		
TPI Programs						
Commercial Recommissioning			●		475	1998 TPI Proposal
Ongoing and Planned California Programs						
Large Nonresidential Comprehensive Retrofit	●		●	●	16.1m PG&E 15.1m SCE; 6.4m SDG&E;	1999 Advice Filings
Small Nonresidential Comprehensive Retrofit	●	●	●	●	19.5m PG&E; 9.4m SCE; 8.6m SCG; 5.5m SDG&E;	1999 Advice Filings
Nonresidential HVAC Turnover	●	●	●	●	8.2m PG&E; 7.2m SCE; .16m SCG; 2.6m SDG&E;	1999 Advice Filings
Previous Utility Initiatives						
PG&E Building Commissioning Program			●		1,200	Mowris Report; elements of this program have been incorporated into the programs described above.
Related Programs (e.g., National efforts)						
NEEA Commissioning in Public Buildings					2,200	Northwest Energy Efficiency Alliance Home Page
Portland Energy Conservation, Inc. (PECI)						Eugene Power Website
Rebuild America						DOE and state websites.

16.2 ENERGY MANAGEMENT SYSTEMS ¾ RELATED PROGRAMS

Although a self-sustaining building commissioning industry does not yet exist, a number of the key market actors needed to develop such an industry are well established, at least in the San Francisco Bay Area targeted by the EMS^{3P} Program. Exhibit 16-1 presents an overview of related utility programs, as well as programs from other areas of the country.

- In the past, prior to the transition to market transformation programs, commissioning activities were most likely to be promoted as an adjunct to utility programs that were oriented to the new construction market or to the retrofit of large, complex systems such as chillers. Several California utilities, notably PG&E, did offer a program to support the re-commissioning of existing buildings in 1997.

- While building re-commissioning was an explicit focus of the 1998 RMA report, the re-commissioning effort has been incorporated into the overall portfolio of commercial retrofit programs. It is listed as a component of the Large Nonresidential Comprehensive Program, the Small Nonresidential Comprehensive Retrofit Program, and Nonresidential HVAC Turnover Programs offered by SCE, PG&E, and SoCalGas. Re-commissioning is specifically mentioned as one of the program elements included in the software tools and design assistance program component of the above programs.

- In other national and regional efforts, the Northwest Energy Efficiency Alliance is striving to make commissioning standard practice for public buildings in the four-state area covered by the NEEA. While the primary focus of this program is to encourage commissioning as part of the design and construction process for new buildings, the program also aims to support retro-commissioning through the development of a commissioning-provider industry and the dissemination of case studies emphasizing both energy and non-energy benefits that can be achieved through re-commissioning of existing buildings.

- Portland Energy Conservation, Inc. (PECI) has for almost a decade been actively promoting building commissioning through the development of case studies, training programs, and an annual national conference on building commissioning. PECI is working with the NEEA to develop a regional association of commissioning agents: the Building Commissioning Association (BCA) Northwest.

- Nationally, the Rebuild America program promotes building commissioning through its web site and other information dissemination activities. Such national organizations as ASHRAE also have an ongoing role in the development of the commissioning market, in part through the development of a standard definition of commissioning.

Exhibit 16-2
Re-Commissioning Market Assessment
Identification of Market Barriers

Market Participants	Market Barriers						
	Perceived low value/cost*	Info/Search Costs	Performance Uncertainty	Organizational Practices/customs	Hassle Cost	Asymmetric Information	Service Unavailability
Building Owners	●						
		●					
			●				
				●			
					●		
						●	
							●
Building Operators		●					
				●			
					●		
							●
A&E Firms Designers	●						
		●					
				●			
							●
EMS Vendors	●						
				●			
					●		

* For A&E firms/designers and EMS vendors, this would be their customers' low perceived value/cost

KEY

● High

● Moderate

● Low

Note: Assessing Importance for Market Barriers, Relevance and Potential Effectiveness for Intervention Strategies and Programs

16.3 ENERGY MANAGEMENT SYSTEMS ¾ MARKET BARRIERS

For *Building Owners*, the some important barriers to having re-commissioning performed are *Perceived Low Value/Cost Ratio* and *Information and Search Costs*. Because building owners are responsible for the decision to initiate and pay for EMS re-commissioning, their perceptions and actions underlie many of the barriers to the development of a re-commissioning market. The barriers associated with each market participant are presented in Exhibit 16-2.

- Doubts about the ability of re-commissioning to deliver promised benefits, particularly relative to the costs associated with re-commissioning activity, are consistently cited by owners and others as a barrier to market development. Owners often believe they are already receiving the benefits that re-commissioning would deliver, having been told by EMS vendors that their equipment has the capability to control virtually all aspects of building operations.

- Similarly, building owners face significant barriers in seeking out and analyzing information on the specifics of building commissioning.

- Performance uncertainty is another important barrier to end users. Given the complexity of modern building control systems, owners are not surprisingly doubtful about the savings potential offered by re-commissioning of EMSs.[5]

- In addition, building owners are reluctant to change their standard practices, which typically emphasize lowest first cost rather than life cycle cost.

- Building operations staff are more likely to embrace the concept of re-commissioning, but also face substantial costs associated with finding and evaluating information. Moreover, building operators may be bound by standard operations and maintenance (O&M) practices that discourage innovation and increase the transaction cost of acquiring "nonstandard" services, especially when those services are not readily available in their market.

- For A&E/design firms, the low perceived value of re-commissioning services is reflected in the perception that customers are unwilling to pay for the extra time involved in designing and ensuring the proper installation of sophisticated energy management systems. Most A&E firms are not fully versed in the workings of EMSs, and would find it difficult to gather the information needed to make informed decisions regarding EMS commissioning.

- EMS vendors have the knowledge required to help their customers pursue commissioning, but competitive pressures typically lead them to emphasize hardware sales, to the exclusion of more labor-intensive services such as commissioning. These vendors are reluctant to change their standard business practices and spend the extra time associated with providing or supporting building commissioning.

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[5] A survey conducted for a study of the market effects of SCE's commercial and industrial programs found that building owners agreed more strongly with the statement "EMSs have performance problems" than any other statement of market barriers to EMSs.

Exhibit 16-3
Re-Commissioning Market Assessment
Assessing the Potential Effectiveness of Intervention Strategies

Market Participants	Market Barriers							Intervention Strategies								
	Perceived low value/cost*	Info/Search Costs	Performance Uncertainty	Organizational Practices/customs	Hassle Cost	Asymmetric Information	Service Unavailability	Cofunding/ Incentives	Tech. Assistance/ Software tools	Training	Information, case studies	Cx Protocols and Standards	Promotion, including nonenergy benefits	Commissioning Agent Certification	Alliances, Info. Exchanges	Support Cx Provider Industry
Building Owners	●							●			●		●		●	
		●							●							
			●													
				●								●				
					●											
						●								●	●	
							●									●
Building Operators		●								●						
				●								●				
					●				●							
							●									●
A&E Firms Designers	●							●								
		●							●		●					
				●									●			
							●									●
EMS Vendors	●												●			
				●							●					
					●										●	

* For A&E firms/designers and EMS vendors, this would be their customers' low perceived value/cost

KEY
● High
● Moderate
● Low

Note: Assessing Importance for Market Barriers, Relevance and Potential Effectiveness for Intervention Strategies and Programs

16.4 ENERGY MANAGEMENT SYSTEMS ¾ INTERVENTION STRATEGIES

The most important intervention strategies to encourage re-commissioning by *Building Owners* are *Co-Funding / Incentives* and *Technical Assistance/Software Tools.* In the short run, financial incentives or direct funding / co-funding of re-commissioning activities can help overcome the barrier of high first cost among owners and their suppliers. To be effective in transforming the market, however, interventions should address barriers for all the market actors involved in the design, installation, and operation of energy management systems. Exhibit 16-3 provides a picture of how each intervention strategy maps to each market barrier.

- Targeted information is needed to provide sufficiently compelling evidence of the benefits of commissioning to cause market actors to make it a standard practice. This information should include promotion of non-energy benefits, which have been found to be an effective driver for commissioning in other markets.
  - To overcome the search costs associated with gathering information on EMSs and re-commissioning, both targeted information / case studies and direct technical assistance (including the provision of software tools) are necessary.
  - These same interventions can help address building owner performance uncertainty and the perceptions of all key players that re-commissioning entails high transaction / hassle costs. If information comes from sources believed to be reliable, such as certified commissioning providers, the asymmetric information barrier will also be addressed.
  - Changing established building owner (and operator) practices can be facilitated through the provision of templates for relevant commissioning paperwork, including testing protocols, bid documents, commissioning agent contracts, etc. The availability of an agreed-upon set of standard documents also makes it easier for other market actors to change their standard practices to include EMS commissioning.

- For building operators, formal training sessions with detailed technical content can help overcome the high search costs of complying with a building owner request to "start doing commissioning."
  - Equally important for this group, commissioning services should be made relatively easily available in the market through the promotion of a commissioning provider industry with an agreed upon set of definitions and performance standards.
  - Certification of commissioning agents can alleviate concerns regarding the credibility of the service and information these providers make available.

- For A&E firms, a primary barrier to commissioning is the perception that customers are unwilling to pay, certainly not enough to cover the extra time required for a design that fully integrates the capabilities of modern EMSs into all building systems.
  - This barrier would be most effectively overcome by generating demand from the customer side.

- This group of market actors can also be influenced, however, through direct promotion and the availability of software tools and other technical assistance that would lead them to reconsider their current practices.

- Like engineering firms, EMS vendors must be convinced that customers will, in fact, assign enough value to commissioning and re-commissioning services to cover the supplier's costs of providing them. In addition to the demand pull created by building owners who have been convinced of the value of re-commissioning, information, promotion, and the development of alliances between control vendors and other actors in this market may all assist in overcoming the inertia of organization practices and the transaction cost associated with more extensive system testing and commissioning.

Exhibit 16-4
Re-Commissioning Market Assessment
Identification of Program Target

Market Participants	Market Barriers							Intervention Strategies									Related Programs							
	Perceived low value/cost*	Info/Search Costs	Performance Uncertainty	Organizational Practices/customs	Hassle Cost	Asymmetric Information	Service Unavailability	Cofunding/ incentives	Tech. Assistance/ Software tools	Training	Information, case studies	Cx Protocols and Standards	Promotion, including nonenergy benefits	Commissioning Agent Certification	Alliances, Info. Exchanges	Support Cx Provider Industry	TPI EMS ReCx	Large Nonres. Comp. Retrofit	Small Nonres. Comp. Retrofit	Nonres. HVAC Turnover	NEEA Cx in Public Buildings	Energy Center of Wisconsin	Portland Energy Conservation, Inc,	Rebuild America
Building Owners	●							●					●		●		●	●	●		●		●	
		●							●		●						●	●	●			●		
			●															●	●	●	●		●	●
				●								●					●				●			
					●												●			●				
						●								●	●									
							●									●					●			
Building Operators		●								●							●	●	●					
				●								●					●	●	●	●				
					●				●								●	●	●			●		
							●									●					●		●	
A&E Firms Designers	●							●									●							
		●							●		●						●	●	●	●	●	●		
				●									●							●	●			
							●									●					●			
EMS Vendors	●												●				●							
				●							●						●				●			
					●										●									

* For A&E firms/designers and EMS vendors, this would be their customers' low perceived value/cost

KEY
● High
● loderate
● Low

Note: Assessing Importance for Market Barriers, Relevance and Potential Effectiveness for Intervention Strategies and Programs

16.5 ENERGY MANAGEMENT SYSTEMS ¾ ASSESSMENT OF POTENTIAL EFFECTIVENESS

The EMS[3p] program primarily addresses building owner barriers, in the expectation that creating demand for commissioning services will spur potential providers to actually make such services available. Exhibit 16-4 describes how the TPI program and related programs are effective, or ineffective, in reducing market barriers. For example, the *Large Nonresidential Comprehensive Retrofit* Program, is relatively effective through its use of *Promotion* and *Co-funding/incentives* but less effective in it use of *Alliances,* in reducing *Perceived Low/Value Cost* for *Building Owners*. The ability of the TPI and related programs to successfully reduce market barriers is addressed below.

- As noted, this program was designed to create a pool of building owners who will be educated consumers of EMS re-commissioning services. To achieve this market effect, the program design employed the following interventions:
  - Co-funding (approximately 67 percent of the total cost) of commissioning for selected buildings.
  - Technical assistance and software tools to help owners understand and quantify the benefits of properly tuning their building EMS, thereby overcoming both search cost and performance uncertainty barriers.
  - Templates to assist owners in streamlining the process of acquiring and managing commissioning services.
- EMS[3P] interventions targeted to building operators were aimed at making this technically oriented group of market actors fully informed about the re-commissioning and ongoing operation of EMSs. Formal training was the centerpiece of this intervention, with other information resources supplementing the hands-on training to make the acquisition of re-commissioning services easier.
- As noted above, the EMS[3P] Program was designed to impact the A&E/design community primarily by creating awareness of and demand for more carefully thought out design of building control systems. Although they were not the primary target audience for the program, A&E firms were also expected to benefit directly from information-oriented interventions such as commissioning protocols and standards, as well as software tools.
- Similarly, EMS vendors, a relatively small group of local offices of large multinational corporations, were not directly targeted by the program but were affected by the promotional aspects of the program, which helped address some of the institutional barriers these organizations face.
- The approach used by the EMS[3P] Program duplicated some elements of the former PG&E Building Commissioning Program, including the availability of software tools and the development of case studies. In addition, the program planned to conduct some training sessions in tandem with PG&E's annual Commissioning Workshop.
- A potential program element that has not been emphasized by past or current programs is certification of commissioning providers. Theoretically, such a program would address asymmetric information barriers faced by building owners as they weigh the costs and benefits of building re-commissioning.

16.6 ENERGY MANAGEMENT SYSTEMS ¾ IMPLEMENTATION EFFECTIVENESS

The EMS^{3P} program focused on a narrow set of objectives, which it was effective in accomplishing. The project was able to conduct the training sessions it proposed. In addition the program successfully re-commissioned ten buildings in the Bay Area. The sponsor did mention some difficulty getting buy in from the UDCs to execute the re-commissioning. In once case a UDC wanted each tenant in a downtown high-rise to sign a wavier. This is was later resolved and the project proceeded.

16.7 ENERGY MANAGEMENT SYSTEMS ¾ POTENTIAL FOR SUSTAINABILITY

Because of its limited scope, The EMS^{3P} Program is unlikely to have sustained effects on the market.

Using a combination of elements that exist or have existed in other market intervention efforts, the EMS^{3P} Program appears have been selected less for its innovative design or approach than for the fact that it addressed a high-potential measure not covered by other California programs at the time.

- The most likely market effects of this program in California are:
  - Increased demand for re-commissioning as a result of growing awareness among building owners of the benefits of commissioning existing EMS installations, as well as greater familiarity with the resources available to deliver commissioning services.
  - A slightly expanded pool of contractors who are qualified and have the experience to provide commissioning services, resulting from the actual commissioning of 20 buildings.
  - Greater proficiency in the use of EMSs to manage and track building energy use among building operators who receive training through the program.
  - Increased ability of A&E firms and EMS vendors to use program information to more aggressively market comprehensive EMS design, testing, and tune-up services to building owners.

- Because of the limited scope of the program and the fact that almost 60 percent of its total budget was earmarked for co-payment of commissioning services, sustained changes in the market are unlikely. Moreover, because the program appears to emphasize the EMS element of re-commissioning at the expense of other critical energy-using systems, those market actors who are directly affected by the program may acquire only a limited understanding of the full scope of commissioning, which by most definitions includes training and documentation activities that are beyond the scope of this program.

16.8 ENERGY MANAGEMENT SYSTEMS ¾ SUMMARY

The EMS^{3P} program was successful in accomplishing modest objectives set forth in the proposal. This limited scope, however, makes it unlikely for the program to have sustained effects on the market.

17. BUILDING OFFICIAL CODE TRAINING

17.1 BUILDING OFFICIAL CODE TRAINING ¾ OVERVIEW AND TECHNICAL POTENTIAL

The Training for Building Officials attempts to increase awareness of code changes in rural or other relatively isolated areas.

17.1.1 Program Overview

Energy codes are often enacted and then ignored: compliance does not occur without a transition strategy for code enforcement. The Energy Training for Building Officials Third-Party Initiative (TPI) program was selected as a TPI program by Southern California Gas Company, though proposals were submitted to all four utilities by the California Building Officials (CALBO) Training Institute.

- The CALBO received a grant from the United States Department of Energy for providing energy code training. This grant was limited, however, and had to be targeted to areas in the state where the greatest construction was occurring. This led to a gap in providing training to building officials in rural areas. Their proposal was designed to address this. Unfortunately, they accepted a contract offered by only one of the UDCs and readily admitted in their final report that they had been unprepared for this real possibility.

- The program provided training at nine host sites in the less urban areas of SCG's service territory. The goal of the program had been to train 720 participants; 279 received training.[1] A pre- and post-program exam was conducted at the training. However, it appears the same test was used for both exams and had been corrected during the class. From this, we conclude that there was no real test of whether this training was effective, and no market effects study or savings forecast was offered to provide an indicator of cost-effectiveness.

- The amount of energy savings from code enforcement in California is still uncertain. Code compliance studies show that adopting an energy code does not mean that the compliance is occurring, nor that the expected savings is being achieved. A study of residential therm savings in Portland, Oregon found measured code savings of 23 percent, compared to planned code savings of 40 percent.[2] A study in Tacoma, Washington found residential compliance at 91 percent (including a program of

[1] *Energy Training for Building Officials Final Report* to Southern California Gas Company by California Building Officials Training Institute, December 1998.

[2] "Therm Impacts and Cost Effectiveness of the 1992 Oregon Residential Building Code," by Mark E. Thompson, Brian McCabe, and John Hanson, *1997 Energy Program Evaluation Conference*, pp. 551-558.

residential rebates to achieve code) and commercial at 88 percent.[3] A study of non-residential compliance in Washington found compliance to the 1990 code changes at 47 percent. Then an extensive Implementation Plan with incentives, promotions and many other elements was implemented as they drafted new code. Compliance to 1995 code with this plan found to be 59 percent.[4] Lighting code compliance was found to be 50 percent for small commercial businesses in Minnesota.[5]

- The system in place for Title 24 consultants and the extensive code training programs over the years is thought to significantly increase the compliance rate in California. One study (looking for the proper baseline for commercial new construction programs) found that actual practice for commercial buildings in California was better than that required by Title 24 in the early 1990s.[6] Preliminary results in a 1997 study suggest a compliance rate in California of 90 percent for homes with a tolerance for model noise of +/-4 percent.[7]

- Very different results were found for a California compliance study of homes in 1997 where a 62 percent non-compliance rate was found, though there were significant methodological issues with this study.[8] The California Energy Commission conducted a study in 1996 that found 50 percent of homes did not meet Title 24.[9]

17.1.2 Program's Technical Potential

Estimates of the program's technical potential could not be found in secondary data sources, and were not reported in the proposal or final report.

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[3] "How Well Is Our Energy Code Working? An Evaluation of the Tacoma, Washington Model Conservation Program," by Jim Perich-Anderson and Linda Dethman, *1994 ACEEE Summer Study*, pp. 6.149-6.156.

[4] "Compliance With the 1994 Nonresidential Washington State Energy Code," by Kevin Madison and David Baylon, *1998 ACEEE Summer Study*, pp. 4.249-4.259.

[5] "Lighting Code Compliance in Small New Commercial Construction in Minnesota," by Czeschin et. al., *1994 ACEEE Summer Study*, pp. 6.59–6.66.

[6] "Establishing a Baseline in Commercial New Construction DSM Impact Evaluation – Comparison of Three Approaches," by Mahone et. al., *1994 ACEEE Summer Study*, pp. 8.123-8.129.

[7] *Selecting Targets for new Market Transformation Initiatives, Phase II, Volume 1*, by American Council for an Energy-Efficient Economy, Xenergy, Inc. and E-Source for Pacific Gas & Electric Company, March 1998.

[8] "Is What You See, What You Get?" by Williams et. al., *1997 Energy Program Evaluation Conference*, pp. 559-565.

[9] *Selecting Targets for new Market Transformation Initiatives, Phase II, Volume 1*, by American Council for an Energy-Efficient Economy, Xenergy, Inc. and E-Source for Pacific Gas & Electric Company, March 1998.

Exhibit 17-1
Building Code Inspection Market Assessment
Related Program Identification

Program	Description	Utility Sponsors				Funding ($000)*	Source
		SCE	SoCalGas	PG&E	SDG&E		
TPI Programs							
Code Training for Rural Inspectors	Provides training for building officials in rural jurisdictions		●			100	1998 TPI Proposal
Ongoing and Planned California Programs							
SCE Codes & Standards Support	1. Code training and public education. 2. Develop Voluntary Design Guidelines to exceed current efficiency requirements. 3. Work with govt. officials, interest groups and public to institutionalize higher levels of efficiency. Same as CBEE	●	●	●	●	971 (SCE) 100 (SoCalGas; above TPI) 951 (PG&E) 240 (SDG&E)	SCE 1999 Advice Filing; SoCalGas 1999 Advice Filing; PG&E 1999 Advice Filing; SDG&E 1999 Advice Filing
Previous Utility Initiatives							
PG&E Energy Standard	Worked with CEC on initial analysis for source energy values as basis for new energy standards (next version of Title 24)			●		240	1998 PG&E Advice Filing
Related Programs (e.g., National efforts)							
Washington Utility Code Group	Implementation Plan for code adoption included Utility Code Group to fund residential incentives to bldrs to get to code, 100% of training costs for 21 mos. Then 50% until 3 years post adoption, 3rd party inspection pool linked to code provision of 3rd party pool for complicated where beyond code officials (rural) funded by applic. fee					$4,000over 3 years for training alone	Article in 1994 ACEEE Summer Study Proceedings by Madison et. al.
Northwest Energy Efficiency Alliance (NEEA) New Construction Council & Local Government Association Support Project	Involving various communities through New Construction Council & Local Government Association Support Project, Long-term strategy being examined						NEEA LGA Support Project documents, NEEA web site, Article in 1998 ACEEE Summer Study Proceedings by Harris and Mahone
Northeast Energy Efficiency Partnership Code Initiative	Initiative still being investigated and designed, various utilities currently support code training efforts						Energy Efficiency Filings for MA utilities, mentioned elsewhere.
Oregon Code Simplification Process & use of Circuit Riders	Oregon is seeking to simplify code to achieve higher compliance, uses circuit riders, at code adoption had residential rebates						Article in 1994 ACEEE Summer Study Proceedings by Perich-Anderson and Dethman; Selecting MT Targets

17.2 BUILDING OFFICIAL CODE TRAINING ¾ RELATED PROGRAMS

There have been many energy code training programs offered by UDCs across the country, but few comprehensive efforts to create a "transformed" code compliance environment. Most have provided only one intervention strategy: training to building code officials. In the demand-side management paradigm, these programs were viewed as supportive educational programs and seldom evaluated for downstream impacts and energy savings. Some contained small promotional efforts. The California effort also included the development of Title 24 consultants. The California Codes & Standards efforts are similar to these prior efforts while also providing an indication of the maximum scope addressed in this view of energy code support. Exhibit 17-1 presents an overview of related utility programs, as well as programs from other areas of the country.

- The current UDC efforts in California are all based upon the basic program design in the California Board for Energy Efficiency (CBEE)'s Advice Filing. The Codes and Standards Support consists of:
  - Code training and public education
  - Development of voluntary design guidelines to exceed current efficiency requirements
  - Working with government officials, interest groups, and the public to institutionalize higher levels of efficiency.

- All four UDCs in California cite these three elements as their Codes & Standards Support programs. However, Southern California Gas Company actually has funded no other activities in this effort except for the Energy Training for Building Officials Third-Party Initiative (TPI) program.

- The Pacific Northwest has seen development of a more comprehensive approach for energy code implementation. As the state of Washington looked at upgrading their code in 1994, they reviewed the compliance they had received with their previous energy code, and found that it had only a 50 percent compliance rate. This caused them to re-think how an energy code should be adopted in order for it to be effective. From this came an Implementation Plan (one for the residential energy code and one for the non-residential energy code) for the energy code adoption. This plan was supported by the Washington utilities through the Utility Code Group. Through this effort utilities supported and funded the following:
  - Incentives for residential builders to build homes to the new code in the first few years of implementation;
  - 100 percent of the training costs for 21 months and 50 percent of training costs for the remainder of the first three years (training costs alone were $4 million over the three years); and
  - A provision that allowed jurisdictions to require a permit applicant to hire a third party inspector when the structural inspection was beyond the capability of the local staff. This provision allowed the development of a third-party market to ensure code compliance in rural areas lacking sufficient resources for the few

commercial projects they see. A program developed from this, the Special Plans Examiner/Inspector (SPE/I) program, which created a cadre of certified personnel to be used for energy code enforcement. The SPE/I cadre provided an alternative source of expertise for building officials in the less urban areas while being paid for directly by the permit application. A compliance study found that the SPE/I program showed a compliance rate of 83 percent compared to 55 percent in a traditional program.[10]

Overall, this effort obtained a compliance rate of 55 percent in 1995 versus a compliance rate after the previous code adoption of 47 percent.[11]

- Oregon and Idaho both use circuit riders to meet the technical assistance needs of building officials in their less urban areas.

- Oregon, like Washington, provided residential rebates to builders for the time immediately after energy code adoption. Additionally, Oregon has undertaken an effort to simplify its code in direct response to research suggesting that a simplified code will achieve greater compliance rates.[12]

- The Northwest Energy Efficiency Alliance (NEEA) supports coordinated regional energy code development, a New Construction Council to be involved in this process, and uses a Local Government Association Support Project to help recruit support for these efforts in local government in the region. (The four states in the NEEA are Washington, Oregon, Idaho, and Montana.)

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[10] "Energy Codes and Market Transformation in the Northwest: A Fresh Look," by Jeff Harris and Doug Mahone, *1998 ACEEE Summer Study*, pp. 7.123-7.134.

[11] "Compliance With the 1994 Nonresidential Washington State Energy Code," by Kevin Madison and David Baylon, *1998 ACEEE Summer Study*, pp. 4.249-4.259.

[12] "How Well Is Our Energy Code Working? An Evaluation of the Tacoma, Washington Model Conservation Program," by Jim Perich-Anderson and Linda Dethman, *1994 ACEEE Summer Study*, pp. 6.149-6.156; and *Selecting Targets for new Market Transformation Initiatives, Phase II, Volume 1*, by American Council for an Energy-Efficient Economy, Xenergy, Inc. and E-Source for Pacific Gas & Electric Company, March 1998.

Exhibit 17-2
Building Code Inspection Market Assessment
Identification of Market Barriers

Market Participants	Market Barriers			
	Info/ Search costs	Organizational Practices/ Public budget costs-limits	Low Perception of Value to Cost	Market Uncertainty/ No end-user demand Unavailability (of Market-based alternative)
Code Officials	●			
		●		
			●	
				●
				●
Builders and End-Users	●			
			●	
				●
3rd-Party inspectors and/or trainers				●
				●

		KEY		
Importance	●	High		
Level	●	Moderate		
	●	Low		

Note: "Importance" for a Market Barrier refers to its strength as a barrier. "Importance" for an Intervention Strategy or a Program refers to its relevance to a barrier and its Potential Effectiveness.

17.3 BUILDING OFFICIAL CODE TRAINING ¾ MARKET BARRIERS

Generally, code enactment has been thought of as an end-result. In fact, many utilities are now looking at enacting energy code upgrades as their exit strategy from market transformation initiatives. Yet, adoption of energy code, as seen above, does not mean automatic compliance and, thereby, transformation. There are barriers to energy code implementation.

A new alternative paradigm has been proposed by Jeff Harris of NEEA and Doug Mahone of the Heschong-Mahone Group. This perspective is to use the tools we are developing in the market transformation effort to examine barriers and test interventions to change energy code adoption and implementation. They propose that doing this can allow an examination of developing creative market-based approaches to achieve code enforcement and compliance in a transformed and sustainable manner. (See "Energy Codes and Market Transformation in the Northwest: A Fresh Look," by Jeff Harris and Doug Mahone, *1998 ACEEE Summer Study*, pp. 7.123-7.134.) Their treatise provides an excellent base for analyzing this market and TPI program similarly to that undertaken in the other market areas.

Building codes have been around for centuries to protect health and safety. Energy codes started being adopted in the 1970's. Energy codes were mandated for the commercial sector and strongly encouraged for the residential sector in EPAct of 1992.[13] Yet, given its history and primary health and safety function, code officials often give little importance to the energy code.

There are many detailed elements to be examined for building code compliance. The additional requirements of the energy code may get lost in the information and search costs added. This is particularly likely given the lower priority energy code is given by code officials. The barriers associated with each market participant are presented in Exhibit 5-2. For this market, the most important barrier faced by code officials is budget limitations. Descriptions of each barrier are presented below.

- Many of the barriers cited as reasons code officials may not fully support ensuring energy code compliance are organizational practice barriers. The strongest of these is probably budget limitations as these are public-funded activities and not market driven. This has still been found to be a factor in California even with third-party officials, as overworked code officials may still miss differences between planned and "as built" buildings.

- The budget limitations and information costs create the costs to code officials of implementing an energy code. The energy code's value is set by the fact that it has a lower priority for code enforcement. These two barriers together translate into a low perception of the value of the energy code by code officials.

[13] See "Building Energy Codes: New Trends," by Harold Crowder and Charles R. Foster III, *1998 ACEEE Summer Study*, pp. 10.31-10.40 for an excellent history and examination of trends.

- There is no demand by the end-users. This means that code officials receive no feedback from end-users telling them that this is important and that the energy code should be enforced.

- Finally, the system often is not designed to create market-based alternatives that might mitigate the barriers seen by the code officials.

- Builders and end-users have the same issues with information search costs and unavailability of a market-based alternative. They also have a low perception of value to cost. For builders and end-users, part of this perspective is a lack of knowledge of the benefits versus the costs of the incremental efforts to meet the energy code. For end-users, there is often the perspective that the codes ensure reliability; the end-users may not even realize that the requirements should offer high efficiency, and that they may be receiving something far less.

- Third party inspectors and trainers sometimes face overwhelming barriers, as the structure of the energy code system does not take them into consideration. (If the service can only be done by the local governments, this may be seen as free or at least less costly than obtaining additional assistance.) No end-user demand translates into no market demand for this potential market participant. This means that third party inspectors and trainers can be market participants, and that the creation of this market can be an intervention strategy.

Exhibit 17-3
Building Code Inspection Market Assessment
Assessing the Potential Effectiveness of Intervention Strategies

Market Participants	Market Barriers					Intervention Strategies							
	Info/ Search costs	Organizational Practices/ Public budget costs-limits	Low Perception of Value to Cost	Market Uncertainty/ No end-user demand	Unavailability (of Market-based alternative)	Training	Overlap with energy rating Promotion	Simplify code	Incentives	Ciruit riders/ Tech. Assistance	Overlap with commissioning	Overlap w/ Energy Star specifications (labeling)	Create 3rd-party market
Code Officials	●	●	●	●	●	●	●	●	●	●	●	●	●
Builders and End-Users	●	●	●	●	●	●	●	●	●	●	●	●	●
3rd-Party inspectors and/or trainers	●	●	●	●	●	●	●	●	●	●	●	●	●

KEY

Importance Level
- ● High
- ● Moderate
- ● Low

Note: "Importance" for a Market Barrier refers to its strength as a barrier. "Importance" for an Intervention Strategy or a Program refers to its relevance to a barrier and its Potential Effectiveness.

17.4 BUILDING OFFICIAL CODE TRAINING ¾ INTERVENTION STRATEGIES

The previous standard for energy code support was *Training*, small *Promotion* efforts (almost exclusively aimed at building officials), and periodic committee work for upgrading energy codes. Exhibit 5-3 provides a picture of how each intervention strategy maps to each market barrier.

- Energy code compliance has just begun to be examined for MT-type interventions. There are many interventions that could be tested for permanent change to energy code implementation. These include the following:
  - Training
  - Automatic compliance overlap with energy rating programs (where achieving a certain energy rating automatically means the building / design passes the energy code)[14]
  - Promotion (for and to all market participants)
  - Simplification of code
  - Incentives
  - Circuit riders / technical assistance
  - Overlapping of energy code with building commissioning (developing building commissioning experts to include energy code issues so that meeting commissioning automatically passes the building for energy code inspection)[15]
  - Overlapping of meeting components of energy code with using Energy Star products (if the energy code matches Energy Star specifications — e.g., if the windows have the Energy Star label — then builders and code officials know that windows automatically pass energy code)[16]
  - Create third party market.

[14] This has been a hallmark of the City of Austin's Energy Star home program and Green Builder's Program. For an additional discussion of this issue see "Home Energy Ratings and Energy Codes – A Marriage That Should Work" by Malcom Verdict, Philip Fairey, Michael DeWein, *1998 ACEEE Summer Study*, pp. 2.231-2.241.

[15] "Energy Codes and Market Transformation in the Northwest: A Fresh Look," by Jeff Harris and Doug Mahone, *1998 ACEEE Summer Study*, pp. 7.123-7.134.

[16] Ibid.

Exhibit 17-4
Building Code Inspection Market Assessment
Identification of Program Targets

Market Participants	Market Barriers					Intervention Strategies									Related Programs				
	Info/ Search costs	Organizational Practices/ Public budget costs-limits	Low Perception of Value to Cost	Market Uncertainty/ No end-user demand	Unavailability (of Market-based alternative)	Training	Overlap with energy rating	Promotion	Simplify code	Incentives	Ciruit riders/ Tech. Assistance	Overlap with commissioning	Overlap w/ energy Star specifications (labeling)	Create 3rd-party market	Bldg official training (rural) TPI	CA UDC Codes & Standards efforts	WA Utility Code Group	Oregon effort	NEEA NCC & LGA Support
Code Officials	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Builders and End-Users	●		●		●		●	●					●			●	●	●	●
3rd-Party inspectors and/or trainers				●	●			●						●		●	●		

KEY

Importance Level
- ● High
- ● Moderate
- ● Low

Note: "Importance" for a Market Barrier refers to its strength as a barrier. "Importance" for an Intervention Strategy or a Program refers to its relevance to a barrier and its Potential Effectiveness.

17.5 BUILDING OFFICIAL CODE TRAINING ¾ ASSESSMENT OF POTENTIAL EFFECTIVENESS

The TPI Building Official Code Training program addresses code officials' information and search costs. Exhibit 17-4 describes how the TPI program and related programs are effective, or ineffective, in reducing market barriers. For example, the *CA UDC Codes & Standards Efforts*, through its use of *Promotion,* was moderately effective in addressing *Low Perception of Value to Cost* for *Code Officials*. The ability of the TPI and related programs to successfully reduce market barriers is addressed below.

As shown in Exhibit 17-4, the TPI Building Official Training program only used training to reduce the *Information and Search Costs* faced by *Code Officials.* This is a duplication of efforts provided through the California UDC Codes and Standards work, and the Washington Utility Code Group.

- The Energy Training for Building Officials TPI program was small, with a lack of market barriers identified, no market transformation targets, no reported energy savings, and no market effects study. There is not enough evidence of program impacts, nor any indication of anything sustainable being gained from this program.

- The programs concentrating on making the code simpler have a much better chance of creating sustainable change in the number of inspectors who are familiar with the code.

17.6 BUILDING OFFICIAL CODE TRAINING ¾ IMPLEMENTATION EFFECTIVENESS

By limiting the geographic area for the project the sponsors felt that the programs success was some how compromised. Originally the sponsors had planned to offer training across the state, and had staffed accordingly. A review of the final report showed that program was able to train 279 individuals about changes to energy standards. It is impossible to determine whether these actions were successfully or not -- because of the study methodology. For example, training participants were given a pre-training exam, which was then corrected in class. Afterwards, in an effort to test changes in code understanding, participants were given the same exact exam. Furthermore, the final report stated that some participants arrived late and did not take the pre-training exam, others left early and did not take the post-training exam. Clearly it is quite difficult to assess any effectiveness of the program other than to say participants went through a training session.

17.7 BUILDING OFFICIAL CODE TRAINING ¾ POTENTIAL FOR SUSTAINABILITY

The Energy Training for Building Officials TPI program was small, with a lack of market barriers identified, no market transformation targets, no reported energy savings, and no market effects study. There is not enough evidence of program impacts or any indication of anything sustainable being gained from this program.

17.8 BUILDING OFFICIAL CODE TRAINING ¾ SUMMARY

The Building Official Code Training program was an attempt to increase awareness of code changes in rural areas. The program may have been hampered some what due to geographical constraints, which forced it to focus only on SoCalGas' service territory. The final report demonstrated a lack of understanding on how to measure market effects, and made a case for separation of implementation and evaluation activities in the future.