Appendix B: 1998 Programs in California and Other States

Prepared for the California Board for Energy Efficiency

Under contract to Southern California Edison Company

FINAL REPORT

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Corporate Energy Benchmarking

A. Program Description and Objectives

Program Administrator Area: Nonresidential
Program Budget: PY98 California PCG DSM Budget $250,000 (Existing Utility Program)
Program Reporting Category: Commercial Energy Management Services
Program Commitment: One year
Program Description and Market Transformation Plan: The Corporate Energy Benchmarking Program was administered in 1998 by one California utility (PG&E). The program helps chain account customers formulate an overall energy efficiency strategy. The first step is to compare energy use in their various facilities to each other and to industry averages. The program then identifies less efficient facilities and sets energy efficiency targets based on benchmarks of higher efficiency. The report for the customer analyzes energy efficiency opportunities in the same terms as other investments so that financial decision-makers will support energy efficiency investments.

The market transformation plan is aimed at developing demand for the program through successful demonstrations at high-profile chain-account customers. Proper advertising and promotion of the program will spur demand. Training and education on how to perform the service will be offered to energy consultants, engineering firms, ESCOs and other Energy Efficiency Service Providers. As the service becomes widely available and demand for the service grows it should become self-sustaining.
Program Implementers and Affiliates: Consultants and utility staff
Customer/Building Type: Commercial chain accounts with small or large facilities
Energy End Uses: all
End Use Technologies, Services, Practices: Filing does not specify equipment types.
Customer Geographic Area: Central and Northern California

B. Market Transformation Characteristics

Market Event: Primary: retrofit and O&M; secondary: equipment purchase
Market Barriers Addressed: Organizational practices or customs, asymmetric information or opportunism, information or search costs, hassle or transaction costs
Market Barriers Not Addressed: Performance uncertainties, bounded rationality, access to or understanding of financing, misplaced or split incentives, inseparability of product features, and service or product unavailability
How is the market changing (if at all)? Similar benchmarking programs are already being offered by some ESPs and ESCOs in California.
Other Marketing Activities in or Outside of California: None identified

Services Provided to Market Actors:
Corporate Energy Benchmarking

Market Actor	Services Provided to Market Actors								
	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Labeling, Standards	Demon-stration	Project Assist-ance	3rd-Party Experts	Other: Energy Bench-marking
Building Owners, Operators	Website								Yes
Designer/Specifier									
Contractors									
Retailers									
Distributors									
Manufacturers									
Lending Agents									
Other:									

C. Indicators of Program Performance

Energy or Value Indicators: No Information

Market Indicators: Customer satisfaction with services and customers using results to make energy efficiency decisions. The program manager provided quotes from two follow-up surveys for the program indicating customers planning to take action as a result of the service. “With the data from CustomNet and with the services of the Energy Center I have been able to obtain funding to retrofit 70 California stores.” “I plan to make operational changes or energy efficiency retrofits as a result of the CustomNet program for 15 facilities”.

Program Activity Indicators: Program milestones include preparation of reports for customers and the development of a Website displaying results.

D. Program Assessment Information

Evaluation of Assumptions: The underlying assumption for this program could be tested by surveying key corporate decision-makers to find out if they believe a report which allows them to compare the efficiency of their facilities to each other and a typical competitor would be useful if it were presented in a manner similar to other investment opportunities.

Support for Market Transformation: The degree to which participating companies use the results to formulate and implement company-wide energy plans is a good indication of the changes in organizational practices. This could be ascertained through post participation surveys. Results may not be entirely conclusive, since companies may have developed energy strategies for other reasons. Another measure of support for market transformation is the number of competitors of participating customers who learn from the participants' experience and develop their own energy plans.

Conditions for Altering or Withdrawing Program: This program was developed in response to feedback from utility account representatives asking for a tool that would help them put energy efficiency information into business terms, using a reporting format that corporate decisions makers can understand. As more customers participate, the program will solicit feedback from participants to find out how to provide a more valuable tool. If feedback from participants indicates that reports are not having an impact on decision making processes, the program should be altered such that new reports take into consideration this feedback. This process should be carried out on an ongoing basis, as reports are completed and presented to participants.

References:

Pacific Gas and Electric Company. *Application of Pacific Gas and Electric Company for Approval of 1998 Energy Efficiency Programs, Shareholder Incentive Mechanism for 1998 Programs, as Cost Accounting Process for Transfer of Surcharge Funds, and Update of Energy Efficiency Commitments*. San Francisco, CA. October 1997.

Pacific Gas & Electric Company. *1998 Customer Energy Efficiency Programs, Advice Filing 2086-G/1776-E, Attachments.* San Francisco, CA. June 1998.

Pacific Gas & Electric Company. *PG&E Second Quarter Status Report.* San Francisco, CA. July 1998.

Pacific Gas & Electric Company. *Evaluation of PG&E's 1996 Nonresidential EMS Programs for Commercial Sector, Draft Report (Study ID#358).* San Francisco, CA. March 1998.

Customer Information

A. Program[2] Description and Objectives

Program Administrator Area: Nonresidential
Program Budget: PY98 California PGC DSM Budget $2.5 million (Existing Utility Program)
Program Reporting Category: Nonresidential Information
Program Commitment: Single year
Program Description and Market Transformation Plan: The Customer Information Program[3] provides commercial and industrial customers with generic (rather than customer specific) information on conservation and energy-efficient equipment and processes, as well as referrals to other program offerings. It provides this information via Internet Websites, toll-free hotlines, a referral service to link customers and energy-efficiency service providers (EESPs), and by providing energy-efficiency information materials, seminars, and exhibits.

The market transformation plan is based on improving awareness among customers so they better understand the added value associated with energy-efficient equipment and services. Vendors and retailers will then be more likely to stock more of these products and manufacturers will continue R&D to keep up with consumer demand. Continued product design improvements will increase demand and ultimately lower the cost of products. Sustainable market transformation is assumed to occur as customers apply and incorporate information about energy efficiency and services gained from the program into their business operations. The vendor referral service is intended to build sustainable relationships between customers and EESPs.
Program Implementers and Affiliates: Utility staff
Customer/Building Type: All nonresidential, but with emphasis on small commercial
Energy End Uses: All, but with emphasis on space heating and cooling
End-Use Technologies, Services, Practices: All
Customer Geographic Area: all CEC climate zones

B. Market Transformation Characteristics

Market Event(s): Primary: renovation (without Title 24); secondary: planned replacement, emergency replacement
Market Barriers Addressed: Information or search costs, hassle or transaction costs, asymmetric information or opportunism, performance uncertainties
Market Barriers Not Addressed: Organizational practices or customs, access to or understanding of financing, misplaced or split incentives, inseparability of product features, and service or product unavailability
How is the market changing (if at all)? Not available
Other Market Transformation Activities in (or Outside) California: The Northwest Energy Efficiency Alliance (NEEA) *Con.WEB* is a monthly on-line newsletter covering energy efficiency and renewable energy around the Pacific Northwest. The NEEA *Energy Ideas Clearinghouse* provides a range of information services that are primarily designed for people who make energy-related decisions for businesses, industries and governments. The NEEA *Evaporator Fan VFD Initiative* provides information aimed at transforming variable-frequency drives into a standard

[2] Note that for 1998 programs, "program" is the *combination* of similar utility-sponsored programs.
[3] Includes Nonresidential C&I for SoCalGas and SDG&E.

technology for evaporator fans in Northwest controlled atmosphere storage warehouses is the goal of this initiative. The NEEA *Scientific Irrigation Scheduling Program* provides information and technical assistance to expand the regional practice of scientific irrigation scheduling, which enables irrigators to use weather and soil data to supply the right amount of moisture to their crops at the right time. The Energy Center of Wisconsin (ECW) *Compressed Air Challenge* provides training and promotional information regarding energy efficiency compressed air systems.

Services Provided to Market Actors:

Customer Information Program

	Services Provided to Market Actors								
Market Actor	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Labeling, Standards	Demon-stration	Project Assist-ance	3rd-Party Experts	Other:
Building Owners, Operators	Yes								
Designer/Specifier									
Contractors									
Retailers									
Distributors									
Manufacturers									
Lending Agents									
Other:									

C. Indicators of Program Performance

Energy or Value Indicators: Data not available

Market Indicators: According to SDG&E, Customer satisfaction surveys show increasing levels of awareness and implementation of energy saving devices and practices. According to SDG&E, evidence of sustainability is provided by field personnel who report that customers are applying the seminar information to their business operations. Each seminar survey provides an opportunity for the customer to request additional specifics and assistance from company personnel. On the average, 35 percent of the customer audience has used this vehicle to gain additional information based on the seminar materials presented.

Program Activity Indicators: As of June 1998, SDG&E had developed and mailed a calendar seminar and workshops to over 1,200 customers and had completed six workshops attended by approximately 320 customers. No other program activity information is available.

D. Program Assessment Information

Evaluation of Assumptions: Not available

Support for Market Transformation: In their 1996 *Scoping Study*, Eto, et al attempted to gauge the market effects of California's information programs. Their investigation included general information programs as well as audit/survey-type programs. Interviews with program managers and review of DSM literature, market evaluations, and M&E reports revealed no conclusive evidence that educational programs were setting off the kind of "chain reaction" described in the market transformation plan above. However, reports of the number of customers served by such programs led the authors to speculate that, "...if these programs do in fact have long-term behavioral effects, the sheer numbers of customers manifesting these effects could be sufficient to induce changes in the functioning of energy-efficiency markets" (p. 55).

Conditions for Altering or Withdrawing Program: None provided, since the current

Administrators believe there will always be a need for customer information programs as new technologies, practices, and services enter the residential marketplace.

References:

San Diego Gas and Electric Company. *Testimony of Yolanda A. Whiting Before the Public Utilities Commission of the State of California*. San Diego, CA. October 1997.

San Diego Gas and Electric Company. *Advice 1104-E/1100-G 1998 Energy Efficiency Program Plans and Budgets*. San Diego, CA. June 1998.

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Northwest Energy Efficiency Alliance. *Evaporator Fan VFD Initiative*. URL:http://www.nwalliance.org. 1998.

Northwest Energy Efficiency Alliance. *Scientific Irrigation Scheduling*. URL:http://www.nwalliance.org. 1998.

Energy Center of Wisconsin. *Compressed Air Challenge*. URL:http://www.ecw.org. 1998.

Energy Center of Wisconsin. *Manufacturers Extension Partnership Program*. URL:http://www.nwalliance.org. 1998.

Small Commercial Customer Surveys and Audits Program

A. Program[4] Description and Objectives

Program Administrator Area: Nonresidential
Program Budget: PY98 California PGC DSM Budget $12.4 million (Existing Utility Program)
Program Reporting Category: Commercial Energy Management Services (EMS)
Program Commitment: Single year
Program Description: The Small Commercial Customer Surveys and Audits (SCCSA) program includes four programs administered in 1998 by four California utilities (PG&E, Edison, SDG&E, and SoCalGas). The SCCSA program provides direct mail surveys, phone surveys, and on-site walk-through surveys to increase customer awareness of energy efficiency opportunities in their facilities and encourage them to adopt specific measures and/or modify operation and maintenance practices. This is done via written reports and/or personal visits by utility field staff. The reports or visits also convey information about how to contact suppliers of energy-efficient products and services and access other utility resources (such as incentive programs).

The SCCSA program is intending to transform the market for many energy-efficient products and services by increasing customer understanding and confidence in such products and services. The customer will not only learn about the performance characteristics and proper application and operation of particular technologies, but will also learn how to use lifecycle costing methods to make better purchasing decisions in the future. It is thought that once customers have participated in the program, they will purchase more energy-efficient equipment. This will have a cumulative effect on the demand for many energy-efficient products and services, eventually increasing their market share and perhaps lowering their purchase costs.

Note that SDG&E found small commercial customers reluctant to allow auditors into their facilities, perhaps because such customers are less aware of the benefits of adopting energy efficiency than larger customers and have limited time availability. As a result, SDG&E has modified its Small Commercial Audits program so that customers are contacted by telephone to arrange site visits and are developing a simple on-line audit accessible through the utility's Website.

Program Implementers and Affiliates: Utility staff, consultants
Customer/Building Type: Customers: All small (< 200 kW demand, < 600,000 kWh annual consumption) or medium-size (> 1 million kWh annual usage) commercial sectors, but special emphasis on retail, professional services, motels, barber/beauty shops, laundries/dry cleaners, photography services, restaurants, schools, and small health care facilities.
Energy End-Uses: All, but emphasis on lighting
End-Use Technologies, Services, Practices: All, but with emphasis on high-efficiency lighting
Customer Geographic Area: All CEC climate zones

B. Market Transformation Characteristics

Market Event: Facility retrofit, equipment purchase
Market Barriers Addressed: Information/search costs, hassle/transaction costs, asymmetric information/opportunism, performance uncertainty, organizational practices or custom
Market Barriers Not Addressed: Access to or understanding of financing, misplaced or split

[4] Note that for 1998 programs, "program" is the *combination* of similar utility-sponsored programs.

incentives, inseparability of product features, and service or product unavailability
How is the market changing (if at all)? Not available
Other Market Transformation Activities in (or Outside) California: None identified, but audit services are offered by many utilities across the country.
Services Provided to Market Actors:
Small Commercial Customer Surveys and Audits Program

	Services Provided to Market Actors								
Market Actor	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Labeling, Standards	Demon-stration	Project Assist-ance	3rd-Party Experts	Other: Surveys Audits
Building Owners, Operators	Yes								Yes
Designer/Specifier									
Contractors									
Retailers									
Distributors									
Manufacturers									
Lending Agents									
Other:									

C. Indicators of Program Performance

Energy or Value Indicators: Projected 1st year savings are 38.7 GWh, 7.5 MW, and 8,582,000 therms (based on past M&E studies); 15 year "program-weighted" measure lifetime. TRC tests were available for three out of four programs within this program group. Cost effectiveness as suggested by these TRC tests ranges from 0.23 (SDG&E), 0.54 (PG&E), and 2.93 (SoCalGas) with a program-budget-weighted average TRC of 1.17.
Market Indicators: The commercial and industrial energy efficiency program market effects study by Quantum Consulting for SCE, indicated largest market effects attributable to audits for HVAC and motors followed by lighting, but the remaining measures (adjustable speed drives and energy management systems) had no measurable market effects.
Program Activity Indicators: As of June 1998, SoCalGas's Commercial EMS program had completed 3,372 small commercial energy efficiency reports. As of June 1998, completed audits and requests for survey materials for SCE's Small Commercial Audit program was approximately 14% of goal. Also as of June, PG&E's Business Energy Management Services had completed 8,026 surveys completed field representatives in all 15 field offices had been trained to use the first completely electronic customer energy survey documentation and reporting system.

D. Program Assessment Information

Evaluation of Assumptions: Some of these assumptions are described in the market effects studies by Quantum Consulting (see references).
Support for Market Transformation: Certain aspects of the long-run success of the Small Commercial Customer Surveys and Audits Program have already been assessed in the market effects studies by Quantum Consulting (see Section C). The utilities suggest counting the number of customers implementing projects or taking action and assessing changes in customers' understanding and awareness about the benefits of energy efficiency following a survey or audit. Both types of data could be collected via surveys, but it would be difficult to attribute project implementation or other action to the Customer Survey and Audit program alone.

Conditions for Altering or Withdrawing Program: The SCCSA Program could be withdrawn when it becomes clear that other market actors are offering energy audit and surveys without PGC support, that most or all eligible customers have been given an effective opportunity to participate, or that the program is unsuccessful.

References:

Eto, J., Prahl R., and J. Schlegel. *A Scoping Study on Energy-Efficiency Market Transformation by California Utility DSM Programs*, Lawrence Berkeley National Laboratory. Berkeley, CA. LBNL-39058. 1996.

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Southern California Gas Company. *Second Quarter Program Review.* July 1998.

Quantum Consulting, Inc. *Evaluating the Market Effects of Southern California Edison's Commercial and Industrial Energy Efficiency Programs.* Annapolis, MD. 1998.

Large Commercial/Industrial/Agricultural Customer Surveys and Audits Program

A. Program[5] Description and Objectives

Program Administrator Area: Nonresidential
Program Budget: PY98 California PGC DSM Budget $8.7 million (Existing Utility Program)
Program Reporting Category: Commercial Energy Management Services (EMS), Industrial EMS, and Agricultural EMS
Program Commitment: Single year
Program Description and Market Transformation Plan: The Large Commercial, Industrial, Agricultural (CIA) Customer Surveys and Audits Program provides on-site walk-through surveys to increase customer awareness of energy efficiency opportunities in their facilities and encourage them to adopt specific measures and/or modify operation and maintenance practices. This is done via written reports and/or personal visits by utility field staff. The reports or visits also convey information about how to contact suppliers of energy-efficient products and services and access other utility resources, such as incentive programs. The Large CIA Customer Surveys and Audits Program also provides written information and workshops to educate customers about standard performance contracting and changes in the electric utility industry in California.

The Large CIA Customer Surveys and Audits Program is intending to transform the market for many energy-efficient products and services by increasing customer understanding and confidence in such products and services. The customer will not only learn about the performance characteristics and proper applications of particular technologies, but will also learn how to use life-cycle costing methods to make better purchasing decisions in the future. It is thought that once customers have participated in the program, they will purchase more energy-efficient equipment or (in the case of larger customers) enter an agreement with a service provider who will obtain such equipment on their behalf or help them with project implementation. This will have a cumulative effect on the demand for many energy-efficient products and services, eventually increasing their market share and perhaps lowering their purchase costs.
Program Implementers and Affiliates: Utility staff, consultants
Customer/Building Type: Commercial > 200 kW demand and/or > 600,000 kWh annual consumption, all industrial, all agricultural
Energy End Uses: All, but with current emphasis on lighting and drive power (motors)
End-Use Technologies, Services, Practices: All, but with current emphasis on high-efficiency lighting for commercial customers, high-efficiency motors and variable speed drives for agricultural customers
Customer Geographic Area: All CEC climate zones

B. Market Transformation Characteristics

Market Event: Facility retrofit, equipment purchase
Market Barriers Addressed: Information/search costs, hassle/transaction costs, asymmetric information/opportunism, performance uncertainty, organizational practices or customs
Market Barriers Not Addressed: Bounded rationality, access to or understanding of financing,

[5] Note that for 1998 programs, "program" is the *combination* of similar utility-sponsored programs.

misplaced or split incentives, inseparability of product features, and service or product unavailability

How is the market changing (if at all)? Not available

Other Market Transformation Activities In or Outside California: Similar programs exist in other states. The ECW *Wisconsin Manufacturers Extension Partnership* is initiating a pilot project to provide manufacturing modernization services to small- to medium-sized Wisconsin industries with a goal to improve the industries' profitability and competitiveness. The Northwest Energy Efficiency Alliance (NEEA) *In-Service Industrial Motors Testing* tests and demonstrates specific ways to assess the efficiency of existing motors in Northwest industries, and document how motor testing can benefit industrial plants.

Services Provided to Market Actors:

Large CIA Customer Surveys and Audits Program

	Services Provided to Market Actors								
Market Actor	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Labeling, Standards	Demon-stration	Project Assist-ance	3rd-Party Experts	Other: Surveys & Audits
Building Owners, Operators	Yes								Receive
Designer/Specifier									Provide
Contractors									
Retailers									
Distributors									
Manufacturers									
Lending Agents									
Other:									

C. Indicators of Program Performance

Energy or Value Indicators: Projected first-year savings are 16.4 GWh, 7.5 peak MW, and 948,000 therms (utility projections based on past M&E studies); program-weighted measure lifetime: 10 years. TRC tests were available for two out of three programs within this program group. Cost effectiveness as suggested by these TRC tests ranges from 1.00 (SCE) to 2.02 (SoCalGas) with a program-budget-weighted average TRC of 1.15.

Market Indicators: The commercial and industrial energy efficiency program market effects study by Quantum Consulting for SCE, indicated largest market effects attributable to audits for HVAC and motors followed by lighting, but the remaining measures (adjustable speed drives and energy management systems) had no measurable market effects.

Program Activity Indicators: As of June, 1998, SoCalGas had completed 129 small industrial energy efficiency reports and SCE made more than 2,500 energy efficiency recommendations throughout its service territory. SCE believes the number of energy efficiency recommendations made in the first six months of 1998 indicate that customers continue to value a neutral party in identifying potential opportunities at their facilities. As of June, 1998 PG&E had completed 8,026 surveys, but how many of these were for “large” customers is not known.

D. Program Assessment Information

Evaluation of Assumptions: Some of these assumptions are described in the market effects studies by Quantum Consulting (see references).

Support for Market Transformation: Certain aspects of the long-run success of the Large CIA

Customer Surveys and Audits Program have already been assessed in the market effects studies by Quantum Consulting (see Section C). Additional short-run performance of the Large CIA Surveys and Audits program (commercial and industrial elements only) could be assessed through the use of a program tracking system. This tracking system would enable program administrators to determine the number of standard performance contracts signed and forecasted kWh savings resulting from the program. The long-run success of the program will be measured on transformation of the market for performance contracts. The degree to which the market has been transformed can be assessed by measuring customer attitudes and knowledge about energy efficiency and over time.

For the agricultural element of the program, the Administrator could track customer awareness of energy efficiency benefits via surveys. The Administrator might also track marketplace demand for preventative maintenance services, but no method for doing so or for separating program influences from "outside" influences on the market is suggested.

Conditions for Altering or Withdrawing Program: SoCalGas suggests that their Industrial Energy Management Services (EMS) program might evolve into an Internet-based self-audit over the next five years. SCE proposes to withdraw their Commercial and Industrial EMS program when performance contracting becomes a standard, widely used method for commercial and industrial customers to secure energy efficiency. Their Agricultural EMS program could be terminated when "...it becomes clear that other market actors are providing equivalent level and quality of energy information and diagnostic services to the customer" (p I-26). SCE suggests that this will be demonstrated when over 50% of the customers in the agricultural segment show increase in knowledge and awareness of energy-efficient pumping systems and the pump efficiency standard procedures are widely adopted by customers and vendors.

References:

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San Diego Gas and Electric Company. *Advice 1104-E/1100-G 1998 Energy Efficiency Program Plans and Budgets.* San Diego, CA. June 1998.

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Southern California Gas Company. *1998 Energy Efficiency Program Plans and Budgets*. Los Angeles, CA. June 1998.

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Energy Efficiency Centers

A. Program[6] Description and Objectives

Program Administrator Area: Nonresidential
Program Budget: PY98 California PGC DSM Budget $2.8 million (Existing Utility Program)
Program Reporting Category: Commercial, Industrial, and Agricultural Energy Management Services
Program Commitment: Multi-year
Program Description and Market Transformation Plan: Energy Efficiency Centers offer demonstrations, educational seminars, information, and consulting assistance focused on helping business customers improve energy efficiency at their facilities. The Centers offer both general trainings and individualized assistance.

The Customer Technology Application Center (CTAC - SCE) specializes in electric technologies and the Energy Resource Center (ERC - SoCalGas) specializes in natural gas applications. Both Centers are located in the heart of one of the most densely populated areas in Southern California. CTAC is a 42,000-square-foot facility with several distinct product and technology centers: the Commercial Products Center, the Lighting Products Center, the Industrial Technology Center; the Home Efficiency Center, the Small Business Center, the Foodservice Technology Center, and the Refrigeration Center. Vendors and manufacturers contribute equipment to showcase technologies. CTAC's 110-seat Executive Conference Center is a focal point for many events at CTAC, including many of the workshops and seminars.

The ERC is a 45,000-square-foot facility including: a 500-seat conference center; showcases for high efficiency natural gas energy technologies; the nation's largest Food Service Equipment Center for testing and demonstrating state-of-the-art gas-cooking equipment; and a clearinghouse for energy and environmental information. The ERC conducts seminars and workshops ranging from boiler heat-recovery systems to the phase out of CFCs. The ERC provides satellite conferencing capabilities and interactive multi-media and building energy computer simulation services. The ERC also provide one-stop shopping for environmental permitting and advice from the Southern California Air Quality Management District (SCAQMD) and the California Environmental Protection Agency (CAL/EPA). Exhibit areas are provided to display manufacturers' equipment to visiting commercial and industrial customers.

The Agriculture Technology Application Center (AGTAC) offers valuable, environmentally-positive, energy efficient, and cost-competitive solutions to the agricultural community. This 16,000-square-foot facility is a companion to CTAC and is located in the heart of one of the most productive agricultural regions in the world, the San Joaquin Valley. AGTAC'S staff of agricultural specialists are supported by the technical experts and energy education programs currently available at CTAC. AGTAC offers farmers, dairymen, food processors, and businesses a large portfolio of programs and services that can help them save money on their energy bills, make more informed decisions about energy use, equipment purchases, production processes, and much more.

Energy Efficiency Centers provide technical support for many other market transformation programs such as the incentives programs, EMS programs, and audit programs. Energy Efficiency Centers offer an energy-measurement equipment lending library and training and assistance in the

[6] Note that for 1998 programs, "program" is the *combination* of similar utility-sponsored programs.

use of such equipment. Energy Efficiency Centers serve end users, design professionals, ESCOs and others who need to use energy-measurement equipment for measurement and verification purposes. They provide important "third party" services between customers and vendors of energy-saving equipment by verifying the performance of equipment and reducing performance uncertainty. Energy Efficiency Centers also lower barriers of information costs associated with implementing energy efficiency by providing a consolidated resource at low or no cost. Technical training and resources offer a unique resource for design professionals to learn state-of-the-art methods in energy efficiency.

The market transformation plan is to increase the demand for energy efficient technologies and services in order to reduce and eliminate market barriers associated with energy efficient design, construction, renovation, replacement, or servicing of buildings, processes or equipment. As market barriers to energy efficiency are reduced and building owners and end users demand energy efficient technologies and services, it is expected that the demand can be satisfied by properly trained consultants, vendors, distributors, manufacturers, and professional organizations.

Program Implementers and Affiliates: Consultants, utility staff

Customer/Building Type: Commercial, industrial, and agricultural

Energy End Uses: HVAC, lighting, refrigeration, pumping systems, compressed air, other.

End-Use Technologies, Services, Practices: Energy-efficient HVAC, lighting systems, air conditioners, air compressors, water pumps, motors, etc.

Customer Geographic Area: All CEC climate zones, with a focus on Central Valley and Southern California.

B. Market Transformation Characteristics

Market Event(s): Planned replacement, retrofit.

Market Barriers Addressed: Performance uncertainties, information or search costs, asymmetric information or opportunism, bounded rationality.

Market Barriers Not Addressed: Organizational practices or customs, hassle or transaction costs, access to or understanding of financing, misplaced or split incentives, and service or product unavailability.

How is the market changing (if at all)? Not available.

Other Market Transformation Activities in (or Outside) California: The PG&E Pacific Energy Center is discussed within the Energy Information Center program summary under the new construction administrator. The Food Service Technology Center is discussed within the Food Service Equipment Center under the nonresidential administrator area. All of these centers overlap various administrator areas.

Services Provided to Market Actors:
Energy Efficiency Centers

Market Actor	Services Provided to Market Actors								
	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Labeling, Standards	Demon-stration	Project Assist-ance	3rd-Party Experts	Other:
Building Owners, Operators	Yes	Yes				Yes			
Designer/Specifier	Yes	Yes				Yes			
Contractors	Yes	Yes				Yes			
Retailers									
Distributors									
Manufacturers									
Lending Agents									
Other:									

C. Indicators of Program Performance

Energy or Value Indicators: Not available.

Market Indicators: Key market indicators include changes in attitudes towards energy efficient design, services, and equipment by end users, building owners, operators, designers, and specifiers as a result of attendance, training or information provided by the Energy Efficiency Centers. A CTAC market effects study prepared for the California Demand-side Measure Advisory Committee (CADMAC) by Hagler Bailly Consulting, Inc., indicated the following market changes[7] for lighting and HVAC end uses: 1) increased purchase of energy efficient equipment among participants; 2) limited evidence of manufacturers increasing promotions; 3) improved diversity and quality of energy efficient lighting; and 4) reduced prices for energy efficient lighting. Hagler Bailly interviewed CTAC seminar participants and found significant reductions in the following market barriers: information costs; performance uncertainty; and information asymmetry. Hagler Bailly found only limited reductions in market barriers associated with bounded rationality.

Program Activity Indicators: As of June, 1998, activity at the CTAC facility included: 10,150 attendees; 757 events; 12 offsite events; 35 seminars; 44 technical demonstrations; 40 outreach events; 350,000 customer contacts. Activity at the AgTAC facility included: 7,623 attendees, 93 events, 26 seminars, 144 technical demonstrations, 2 new exhibits, 12 outreach events, 38,200 customer contacts. No program activity was available for the SoCalGas ERC.

D. Program Assessment Information

Evaluation of Assumptions: The underlying assumption of this program is that end users, building owners, operators, designers, and specifiers lack the information (including expert advice) they need to undertake energy efficiency projects. This assumption was tested by the Hagler Bailly study in which they interviewed program participants and found significant reductions in informational barriers to energy efficiency.

Support for Market Transformation: Certain aspects of the long-run success of the Energy Efficiency Centers have already been assessed in the Hagler Bailly CTAC Market Effects Study (noted above). Other utility-sponsored and CADMAC-sponsored market effects studies (in progress) would be a good source for further information regarding support for market

[7] According to Peters, et al, there is no link to CTAC program intervention associated with these market changes.

transformation.

Conditions for Altering or Withdrawing Program: Conditions for altering or withdrawing program will depend on the degree to which Energy Efficiency Center activities are being provided by other market actors.

References:

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Southern California Edison Company. *1998 Energy Efficiency Programs, Quarterly Report Second Quarter*. Rosemead, CA. July 1998.

Southern California Gas Company. *Application of Southern California Gas Company*. Los Angeles, CA. October 1997.

Southern California Gas Company. *1998 Energy Efficiency Program Plans and Budgets*. Los Angeles, CA. June 1998.

Southern California Gas Company. *Second Quarter Program Review*. Los Angeles, CA. July 1998.

Building Recommissioning Program

A. Program Overview

Program Administrator: Nonresidential
Program Budget: $1.7 million (New PY98 Utility Program and 3rd-Party Programs)
Program Reporting Category: Commercial Energy Management Services
Program Commitment: Multi-year
Program Description and Market Transformation Plan: The Building Recommissioning Program is comprised of PG&E's Building Commissioning Program, a PG&E Third-Party initiative and several out-of-state programs. It provides case studies, environmental control systems performance analysis, benchmarking of standard equipment against energy efficient equipment, performance analysis software, how-to guides, training, assessment, assistance, and "tune-ups" for building mechanical systems. Once building operators understand the energy savings possible with a properly-working mechanical system, and have experience doing recommissioning themselves or contracting out for it, they will be more likely to do so again in the future with the same building or additional facilities.

Recommissioning is the process of checking an existing building's operational system to make sure it is working as designed. Performance analysis goes a step beyond recommissioning by recommending measures that significantly improve the performance of the systems. Both are important steps in verifying and improving the efficient operation of a commercial building. In addition to benefits such as increased occupant comfort, better indoor air quality, improved functioning of the building system, and reduced operations and maintenance expenses, commissioning and performance analysis can save much energy.

PG&E's 1998 Commissioning and Performance Analysis case studies are showing potential energy savings of from 10% to over 50%. Many of the performance improvements result from low-cost or no-cost fixes such as adding programmable thermostats and making economizers functional.

The market transformation plan is aimed at developing building recommissioning and performance analysis as a self-sustaining service. The plan will be accomplished by training mechanical contractors and engineering firms to provide the service and by educating building owners and facility operators on the economic savings and productivity gains that can be achieved through recommissioning. As the demand for recommissioning and performance analysis grows, and the service industry to support the demand grows, the market for building recommissioning should become self-sustaining.

Program Implementers and Affiliates: Consultants (Third Party), utility staff
Customer/Building Type: Large commercial - office buildings, government facilities, hotels, hospitals, laboratory, high tech and bio-tech facilities
Energy End Uses: HVAC, lighting
Energy End Use Technologies: HVAC systems, controls, lighting
Customer Geographic Area: California urban areas

B. Market Transformation Characteristics

Market Event: Primary: building recommissioning and performance analysis; secondary: building retrofit

Market Barriers Addressed: Hassle cost, information or search costs, organization practices or custom, product or service unavailability
Market Barriers Not Addressed: Performance uncertainties, asymmetric information or opportunism, bounded rationality, access to or understanding of financing, misplaced or split incentives, inseparability of product features
How is the market changing (if at all)? Not available
Other Market Transformation Activities In or Outside California: The Consortium for Energy Efficiency (CEE) *Quality Installation Guidelines Development* seeks to provide installation guidelines regarding energy efficient equipment for installers, contractors, and commercial builders. The Northwest Energy Efficiency Alliance (NEEA) *Building Energy Use Simulation* is designed to increase the viability and adoption of energy efficiency retrofits and commissioning services in small commercial buildings, particularly those in rural areas east of the Cascades. The NEEA *Building Commissioning Assessment* is evaluating the regional market for private sector building commissioning and developing a plan to intervene in the marketplace. The NEEA *Commissioning Public Buildings in the Pacific Northwest* seeks to integrate commissioning into Northwest state and local government buildings. The Northeast Energy Efficiency Partnership (NEEP) *Energy Efficient Packaged HVAC Equipment and Practices for Commercial Buildings* seeks to improve contractor techniques for sizing, selecting, installing, and specifying high efficiency HVAC systems. The NEEP *Energy Efficient Lighting for Commercial Facility Remodels and Expansions* seeks to achieve establish energy efficient lighting systems as a standard practice in commercial facility remodeling projects.
Services Provided to Market Actors:
Building Recommissioning Program

	Services Provided to Market Actors								
Market Actor	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Labeling, Standards	Demon-stration	Project Assist-ance	3rd-Party Experts	Other: equipment "tune-ups"
Building Owners, Operators	Yes	Yes					Yes		Receive
Designer/Specifier									
Contractors							Provide		Provide
Retailers									
Distributors									
Manufacturers									
Lending Agents									
Other:									

C. Indicators of Program Performance

Energy or Value Indicators: Not available
Market Indicators: Not available
Program Activity Indicators: Not available

D. Program Assessment Information

Evaluation of Assumptions: The primary assumption is that there are significant energy savings available from building recommissioning and performance analysis at very low cost. The secondary assumption is that building owners and operators will demand building recommissioning services once they are made aware of the assumed cost-effective energy savings.

These assumptions can be tested and evaluated based on demonstration projects funded by the program. Market surveys should be conducted to evaluate the attitudes of participating and non-participating building owners and operators in order to evaluate the demand for recommissioning services.

Support for Market Transformation: Support for market transformation could be measured through pre- and post-survey techniques assessing the degree to which the building owner's and manager's knowledge of recommissioning concepts has been broadened and how this knowledge shall be applied in future projects.

Conditions for Altering or Withdrawing Program: Conditions for altering or withdrawing the program depend on the success or failure of the program to develop both the demand for building recommissioning services and the necessary providers of these services.

References:

Pacific Gas and Electric Company. *PG&E's Third Party Proposal Program Specific Conditions: Energy Management System (EMS) Services.* San Francisco, CA. 1998.

Pacific Gas and Electric Company. William Miller and Don Felts. "PG&E Energy Efficiency Program Supplemental Information." San Francisco, CA August 1998.

Consortium for Energy Efficiency. *Quality Installation Guidelines Development*. Boston, MA. 1998.

Northwest Energy Efficiency Alliance. *Building Energy Use Simulation.* URL:http://www.nwalliance.org. 1998.

Northwest Energy Efficiency Alliance. *Building Commissioning Assessment.* URL:http://www.nwalliance.org. 1998.

Northwest Energy Efficiency Alliance. *Commissioning Public Buildings in the Pacific Northwest.* URL:http://www.nwalliance.org. 1998.

Northeast Energy Efficiency Partnership. *Energy Efficient Packaged HVAC Equipment and Practices for Commercial Buildings*. URL:http://www.neep.org. 1998.

Northeast Energy Efficiency Partnership. *Energy Efficient Lighting for Commercial Facility Remodels and Expansions*. URL:http://www.neep.org. 1998.

Facility Engineer Training Program

A. Program[8] Description and Objectives

Program Administrator: Nonresidential
Program Budget: PY98 California PGC DSM Budget $260,000 (New PY98 Utility Program and Out-of-State Programs)
Program Reporting Category: Nonresidential Information
Program Commitment: Two years
Program Description and Market Transformation Plan: The Facility Engineer Training Program (FETP) provides training and certification to building operators and facility managers on energy efficiency operations and maintenance practices. The certification program is comprised of three courses that are conducted by the University of California San Diego (UCSD): HVAC Systems Designs; Facility Power Management; and Industrial Plant and Equipment Economics.

The market transformation plan hinges on obtaining organizational support for the program from large commercial building owners or management. Once owners and managers have accepted the concept of continuing education for their facility engineering staff, they will be more likely to implement their recommendations. As a result of the training, facility engineers will know what O&M practices and purchasing guidelines to recommend and, perhaps more important, how to obtain management approval for energy efficiency investments. As the Facility Engineer Training Program continues over time, the cumulative impact of trained building operators will increase the demand for energy-efficient products and services in the large commercial and industrial market.
Program Implementers and Affiliates: Consultants, utility staff, certifying agency (UC San Diego)
Customer/Building Type: All non-residential, but focus on medium to large commercial and industrial
Energy End Uses: All
End-Use Technologies, Services, Practices: All, with emphasis on HVAC system designs, facility power management, and industrial plant and equipment economics
Customer Geographic Area: All CEC climate zones

B. Market Transformation Characteristics

Market Event: Primary: daily operations and maintenance; secondary: retrofit and equipment purchase
Market Barriers Addressed: Information/search costs, hassle costs, performance uncertainty, organizational practices or customs, asymmetric information or opportunism
Market Barriers Not Addressed: Access to or understanding of financing, misplaced or split incentives, inseparability of product features, and service or product unavailability
How is the market changing (if at all)? Not available
Other Market Transformation Activities In or Outside California: The Northwest Energy Efficiency Alliance (NEEA) *Northwest Energy Education Institute* provides training and education for the entire region through the Northwest Energy Education Institute, based at Lane Community College in Eugene, OR. The institute provides customized training for energy

[8] Note that for 1998 programs, "program" is the *combination* of similar utility-sponsored programs.

professionals as well as specific training in support of Alliance market transformation ventures. It also will offer an energy efficiency degree program and will promote energy efficiency curricula in Northwest community colleges. The NEEA *Building Operator Certification* provides training in energy-efficient practices and technologies under coordinated programs offered in Washington, Oregon and Idaho. Those who successfully complete a training series earn certification, and are expected to be able to reduce energy and resource consumption in the facilities they operate.

Services Provided to Market Actors:

Facility Engineer Training Program

Market Actor	Services Provided to Market Actors								
	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Labeling, Standards	Demonstration	Project Assistance	3rd-Party Experts	Other:
Building Owners, Operators		Training certificate							
Designer/Specifier									
Contractors									
Retailers									
Distributors									
Manufacturers									
Lending Agents									
Other:									

C. Indicators of Program Performance

Energy or Value Indicators: Energy savings data not available; "program-weighted" measure lifetime: 15 years

Market Indicators: No effects have been observed due to recent program implementation. The program has not been in field long enough to provide evidence of sustainability.

Program Activity Indicators: As of July 1998, the certification course curriculum was developed and is being implemented through a partnership with UCSD. During the first semester, 24 students registered for the certification program. While the summer semester is just beginning, the participation rate in the program is lower than expected. SDG&E is currently investigating various means of increasing program participation, such as having a wider array of courses qualifying for certification.

D. Program Assessment Information

Evaluation of Assumptions: Not available

Support for Market Transformation: Not available

Conditions for Altering or Withdrawing Program: Not available

References:

San Diego Gas and Electric Company. *Testimony of Yolanda A. Whiting Before the Public Utilities Commission of the State of California*. San Diego, CA. October 1997.

San Diego Gas and Electric Company. *Advice 1104-E/1100-G, 1998 Energy Efficiency Program Plans and Budgets*. San Diego, CA. June 1998.

San Diego Gas and Electric Company. *1998 Second Quarter Program Status Update.* San Diego, CA. July 1998.

Northwest Energy Efficiency Alliance. *Building Operator Certification*. URL:http://www.nwalliance.org. 1998.

Northwest Energy Efficiency Alliance. *Northwest Energy Education Institute.* URL:http://www.nwalliance.org. 1998.

Food Service Equipment Center

A. Program Description and Objectives

Program Administrator Area: Nonresidential
Program Budget: PY98 California PGC DSM Budget $1.9 million (Existing Utility Program)
Program Reporting Category: Commercial energy management services
Program Commitment: Multi-year
Program Description and Market Transformation Plan: The Food Service Equipment Center[9] (FSEC) exists to provide the commercial food service industry with impartial, reliable, and useful information to stimulate the energy-efficient design, operation, and purchase of commercial food service facilities. The FSEC has pioneered American Society of Testing and Materials (ASTM) test methods for assessing the energy efficiency of cooking equipment. The FSEC also provides customers with information on high efficiency cooking equipment, workshops, demonstrations, and testing information. In addition, the FSEC has become heavily involved in kitchen HVAC work, an important and poorly understood specialty field within HVAC design. The FSEC provides benefits to all major market segments in the food service industry. These include: food service operators/end-users (e.g., chain restaurants, chain supermarkets, hotels, and institutional food service in educational, healthcare, correctional, and military facilities), equipment manufacturers and dealers, designers and equipment specifiers, professional and trade associations, codes and standards organizations, and utilities. The commercial food service market is the most energy-intensive commercial market sector.

The market transformation plan is to increase the demand for testing and demonstration of energy-efficient food service technologies in order to reduce and eliminate market barriers. As market barriers are reduced and end users begin to demand energy-efficient food service technologies, it is hoped the demand can be satisfied by consultants, vendors, distributors, and manufacturers.

Program Implementers and Affiliates: Utility staff
Customer/Building Type: Customer: Small commercial; Building Type: restaurants, hotels, institutional food service
Energy End Uses: Ventilation, refrigeration, cooking, dishwashing, (food service)
End Use Technologies, Services, Practices: Gas and electric cooking equipment (ovens, fryers, grills, ranges), refrigeration equipment (walk-in, reach-in), dishwashers, fans, blowers
Customer Geographic Area: Central and Northern California

B. Market Transformation Characteristics

Market Event: Equipment purchase
Market Barriers Addressed: Performance uncertainties, information or search costs, hassle or transaction costs, inseparability of product features, service or product unavailability, asymmetric information or opportunism

[9] The Energy Efficiency Centers (administered by SCE and SoCalGas) include Food Service Equipment Centers that are similar to the specialized PG&E Food Service Technology Center (e.g., they provide testing and demonstration of electric and natural gas Food Service Technologies). These elements were left within the Energy Efficiency Centers Program since their budget could not be disaggregated.

Market Barriers Not Addressed: Access to or understanding of financing, organizational practices or customs, bounded rationality, misplaced or split incentives,

How is the market changing (if at all)? The FSEC has been in operation since 1987, and in that time has developed a national reputation for useful information regarding the specification and operation of high-efficiency food service equipment and practices. The FSEC influences the food service industry at a national level. It has also developed test methods that allow comparison between different brands of food service equipment.

Other Market Transformation Activities In or Outside of California: Southern California Edison and California Gas Company operate similar food service centers. These are included within the program description and budget described in the Energy Efficiency Centers Program.

Services Provided to Market Actors:

Food Service Equipment Center

Market Actor	Services Provided to Market Actors								
	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Labeling, Standards	Demon-stration	Project Assist-ance	3rd-Party Experts	Other: ASTM test methods
Building Owners, Operators	Yes	Yes				Yes			
Designer/Specifier	Yes	Yes				Yes			
Contractors									
Retailers									
Distributors									
Manufacturers	Yes	Yes				Yes			
Lending Agents									
Other: Food Service Industry									Yes

C. Indicators of Program Performance

Energy or Value Indicators: Not available

Market Indicators: According to PG&E, several large commercial food service customers are increasing their reliance on equipment performance tests as an important criterion in equipment purchasing decisions. These tests are made according to ASTM test methods developed by the PG&E Food Service Technology Center (FSTC). Prior to the development and application of the test methods, it was virtually impossible for food service operators to consider energy efficiency in purchasing decisions. This project has changed prior practice. The demand for FSTC equipment test reports, and seminars and other information remains high. Increased demand for objective test data affirms the sustainability of the market transformation effect; increasingly, the industry wants and needs performance information. The fact that the project has historically received and continues to receive significant co-funding from third parties (Gas Research Institute, Electric Power Research Institute, and the California Energy Commission) is evidence of the long-term sustainability of the project's results.

Program Activity Indicators: As of June, 1998, PG&E's FSTC was operating with more than 100 new contacts. Four new test methods developed out of six required. Six seminars held out of ten required. Seven test reports completed out of ten required.

D. Program Assessment Information

Evaluation of Assumptions: The underlying assumption of the FSEC program is that energy

efficiency in the food service sector is hampered by a lack of standardized test procedures that allow purchasers to make energy-efficient choices. This assumption could be tested by surveying purchasers to discover their current equipment selection criteria and assess whether these would change if test information were provided.

Support for Market Transformation: Measures of success include the number of test methods developed, number of new appliances tested, distribution of reports, feedback from industry, increases in R&D efforts (involving testing at the FSEC), increased availability of high-efficiency equipment, site surveys performed.

Conditions for Altering or Withdrawing Program: Conditions for altering or withdrawing program will depend on the degree to which the Food Service Equipment Center activities are being provided by other market actors.

References:

Pacific Gas and Electric Company. *Application of Pacific Gas and Electric Company for Approval of 1998 Energy Efficiency Programs, Shareholder Incentive Mechanism for 1998 Programs, as Cost Accounting Process for Transfer of Surcharge Funds, and Update of Energy Efficiency Commitments*. San Francisco, CA. October 1997.

Pacific Gas & Electric Company. *1998 Customer Energy Efficiency Programs, Advice Filing 2086-G/1776-E, Attachments.* San Francisco, CA. June 1998.

Pacific Gas & Electric Company. *PG&E Second Quarter Status Report.* San Francisco, CA. July 1998.

Nonresidential Financing Program

A. Program Description and Objectives

Program Administrator Area: Nonresidential Retrofit
Program Budget: PY98 California PGC DSM Budget $400,000 (New PY98 Utility Program)
Program Reporting Category: Nonresidential Other
Program Commitment: Single year
Program Description and Market Transformation Plan: As originally envisioned, the Nonresidential Financing Program was designed to help financial institutions develop, market, and implement simple financing programs for small commercial customers who wish to undertake energy efficiency improvement projects. However, SDG&E reports the following in their June 1998 filing to the CPUC: After considerable research, it was determined that the financial institutions were not interested in offering financing options for energy efficiency upgrades to the smaller customer targeted by this program. As a result, the program is being implemented through a single partnership with SAFE-BIDCO - a state-funded non-profit organization. The Nonresidential Financing Program promotes financing through SAFE-BIDCO loans for energy efficiency upgrades for small commercial customers. An energy audit is offered to all customers attempting to qualify their projects with SAFE-BIDCO, which has streamlined their loan application process in response. Audit program results have also been expanded to provide the customer with information on the financing that could have been received through the Nonresidential Financing Program. Promotional materials for the program are distributed by small commercial auditors, energy service representatives, and the utility telephone center.

The market transformation plan is for SAFE-BIDCO to demonstrate that loans for improving home energy efficiency are a viable financial service. Other financial institutions are eventually expected to follow SAFE-BIDCO's lead and begin offering such a service as a for-profit venture.

Program Implementers and Affiliates: Utility staff, SAFE-BIDCO
Customer/Building Type: All types of small commercial (undefined in program description)
Energy End Uses: All
End-Use Technologies, Services, Practices: All
Customer Geographic Area: All CEC climate zones

B. Market Transformation Characteristics

Market Event(s): Primary: planned replacement; secondary: renovation (w/o Title 24), retrofit
Market Barriers Addressed: Information or search costs, hassle or transaction costs, access to or understanding of financing, service or product unavailability
Market Barriers Not Addressed: Organizational practices
How is the market changing (if at all)? Not available.
Other Market Transformation Activities in (or Outside) California: None identified

Services Provided to Market Actors:
Nonresidential Financing Program

Market Actor	Services Provided to Market Actors								
	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Labeling, Standards	Demon-stration	Project Assist-ance	3rd-Party Experts	Other
Building Owners, Operators	Yes			Yes					
Designer/Specifier									
Contractors									
Retailers									
Distributors									
Manufacturers									
Lending Agent	Yes			Provide loans					
Others									

C. Indicators of Program Performance

Energy or Value Indicators: Not available.
Market Indicators: Not available
Program Activity Indicators: As of June, program fact sheets and print advertisements had been developed. The program was slated to become operational shortly thereafter.

D. Program Assessment Information

Evaluation of Assumptions: Not available
Support for Market Transformation: Not available
Conditions for Altering or Withdrawing Program: The program support could be withdrawn or its level of support reduced if a sufficient number of institutions were able to offer this type of financing as a profit-making venture.

References:

San Diego Gas and Electric Company. *Testimony of Yolanda A. Whiting Before the Public Utilities Commission of the State of California*. San Diego, CA. October 1997.

San Diego Gas and Electric Company. *Advice 1104-E/1100-G 1998 Energy Efficiency Program Plans and Budgets*. San Diego, CA. June 1998.

San Diego Gas and Electric Company. *1998 Second Quarter Program Status Update.* San Diego, CA. July 1998.

Nonresidential Standard Performance Contract (NSPC) Program

A. Program[10] Description and Objectives

Program Administrator Area: Nonresidential
Program Budget: PY98 California PGC DSM Budget $42.9 million (New PY98 Utility Program)
Program Commitment: Multi-year
Program Reporting Category: Commercial/Industrial Energy Efficiency Incentives
Program Description and Market Transformation Plan: The NSPC Program was administered in 1998 by three California utilities (PG&E, Edison, and SDG&E). The primary objective is to transform the delivery of financial incentives for energy efficiency products and services from monopoly utilities to multiple private Energy-Efficiency Service Providers[11] (EESPs) who will develop lasting relationships with customers.

EESPs or customers enter into a contract with the program administrator in which they receive posted prices for delivered energy savings achieved by installing high-efficiency measures at a customer facility or set of facilities. Program rules, requirements, incentive levels, and contracts are standardized statewide for all participants. The posted prices for average annual energy savings vary by end use: $0.075/kWh for lighting, $0.21/kWh for HVAC and refrigeration, and $0.11/kWh for all other electric measures. Payments are based on average documented savings, paid out over a two-year term (i.e., one year's worth of savings is paid out over two years). The NSPC program is pay-for-performance. NSPC payments are tied to verified savings over the first two years based on a pre-specified set of measurement and verification (M&V) protocols. In contrast to demand-side management (DSM) bidding programs (e.g., PG&E's PowerSaving Partners), which are only open to a few firms that are selected through a competitive bid process, any EESP or customer can propose a project on a first-come, first-served basis as long as funding is available. Accordingly, an EESP must define specific projects during the application process—before the contract is signed with the program administrator.[12]

The market transformation plan aims to develop greater customer knowledge of energy efficiency services, build better relationships between EESPs and customers, and create more sophisticated EESP marketing and business practices. By encouraging involvement of contractors and EESPs in the NSPC program, these players will gain crucial experience and skills in the energy efficiency industry that will enable them to continue offering energy efficiency products and services to customers in the absence of the program. The ultimate goal is to build a fully competitive, robust, and self-sustaining market for EESPs to deliver energy efficiency products and services.

[10] Note that for 1998 programs, "program" is the *combination* of similar utility-sponsored programs.
[11] Multiple private EESPs include Energy Service Companies (ESCOs), contractors, consultants, and customers.
[12] A project is defined as installation of energy-efficiency measures at a project site for which projected energy savings are greater than 200,000 kWh/year. Any number of project sites may be submitted by an EESP or customer if they are similar (e.g., chain stores), contingent on having the same EESP, measure, occupancy schedule, functional use and energy consumption pattern. Up to 10 project sites may be aggregated as a project even if they are dissimilar.

Program Implementers and Affiliates: Implementers: customers; ESCOs; mechanical, electrical and lighting contractors; consultants.
Customer/Building Type: Customers: medium commercial (grocery, retail, offices, schools, colleges, hospitals, government buildings), large commercial and industrial (manufacturing, aerospace, paper/pulp products, glass, wood products, etc., no data available by SIC codes)
Energy End Uses: HVAC (74%), lighting (20%), other (compressed air, motors, process – 6%) based on project applications.
End-Use Technologies, Services, Practices: All technologies are included. Most common are: T-8 fluorescent lamps with electronic ballasts, HVAC controls, chillers, cooling towers, fans, air compressors, variable-speed drives, and motors.
Customer Geographic Area: All

B. Market Transformation Characteristics

Market Event(s): Retrofit, planned replacement, renovation (unknown if require Title 24)
Market Barriers Addressed: Low levels of activity between private energy service companies and customers (*organizational practices or customs, service or product unavailability*). Lack of customer knowledge about energy efficiency services (*information or search costs*). Lack of funding for energy efficiency projects or services (*access to financing*). Non-traditional participants such as customers, contractors and engineering firms do not take part in pay-for-performance energy efficiency programs (*organization practices*). Marketing and educational efforts to increase customer's familiarity with benefits (*performance uncertainty)*, the difficulty of measuring actual savings) and to promote customer-specific projects (*tailored applications, local control*), Hassle costs may be reduced by EESPs facilitating projects where customers lack knowledge and expertise *(hassle or transaction costs)*.
Market Barriers Not Addressed: Asymmetric information or opportunism, bounded rationality, misplaced or split incentives, inseparability of product features
How is the market changing (if at all)? It is too early to tell if the market for these services is changing, if at all. Interim indicators are that the program is on track
Other Marketing Activities in (or Outside) California: Public Service Electric and Gas' (PSE&G) Standard Offer Program in New Jersey (Goldman, et al. 1995)
Services Provided to Market Actors:
Nonresidential Standard Performance Contract

	Services Provided to Market Actors								
Market Actor	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Labeling, Standards	Demon-stration	Project Assist-ance	3rd-Party Experts	Other:
Building Owners, Operators				NSPC Incentives					
Designer/Specifier				NSPC Incentives					

Contractors				NSPC Incentives					
Retailers									
Distributors									
Manufacturers									
Lending Agents									
Other: ESCOs, EESPs				NPSC Incentives					

C. Indicators of Program Performance

Energy or Value Indicators: Preliminary estimates of 1st year electricity savings are 285 GWh (39% lighting, 50% HVAC, and 11% other) and 1,000,000 therms. 15-year program-weighted measure lifetime. TRC test results range from 1.86 (SDG&E) to 2.08 (PG&E) to 4.01 (SCE). The program-budget-weighted average TRC is 2.88. Energy savings are based on site-specific analyses provided for each customer site in the project description. Site-specific M&V results will be used to verify the savings over two years.

Market Indicators: Analyses from the CEC and Goldman, et al, provided the following potential market indicators. Approximately 50 to 60 percent of the project applications are from customers. This indicates that EESPs and ESCOs might not be benefiting from NSPC as much as originally thought. However, it may be that while the customer *applies* for NSPC funding, an ESCO *implements* the project. In the past customers might not have received project management services from EESPs so need time to become more familiar and comfortable working with them instead of the utilities.

Program Activity Indicators: As of May 1998, SCE and PG&E's programs were fully subscribed, while SDG&E has committed almost 80 percent of program funds (based on project applications).

D. Program Assessment Information

Evaluation of Assumptions: According to Goldman, et al, assessing the vibrancy of California's private-sector energy-efficiency industry is complicated by ambiguity about what exactly is the market that the NSPC program seeks to transform. The evaluation should address three broad issues: (1) the program's impact on the market for performance contracting, (2) the program's impact on the growth and expansion of the EESP industry, and (3) the program's impact on reducing customer market barriers to pursuing cost-effective energy-efficiency investments in the nonresidential sector. The focus of the evaluation may depend to some extent on one's definition of the market and market barriers being addressed by the NSPC program. Potential measures of the "success" of an SPC-type program include: (1) successful entry by EESPs, (2) market share for retail suppliers offering energy-efficiency services compared to those that focus on "commodity-only" supply, and (3) penetration rates in various market segments for energy-efficiency "value-added" services and providers. These underlying assumptions cannot be fully evaluated at this time.

Support for Market Transformation: Many questions, but no answers yet (see evaluation assumptions, above). According to Goldman, et al, the primary issues facing evaluators of the California nonresidential SPC program is the influence of changes in the energy-efficiency services market that are occurring as a result of electricity industry restructuring. CBEE is sponsoring an evaluation of the PY98 NSPC Program, and results should be available in late 1998.

Conditions for Altering or Withdrawing Program: A multi-year program with a progressively

increasing program size and a declining standard offer price structure could encourage growth of the market and reduce the need for public subsidies over time.

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Small Commercial "Downstream" Incentives Program

A. Program[13] Description and Objectives

Program Administrator Area: Nonresidential
Program Budget: PY98 California PGC DSM Budget $16.6 million (Existing Utility Program)
Program Reporting Category: Commercial Energy Efficiency Incentives
Program Commitment: Single year
Program Description and Market Transformation Plan: The Small Commercial "Downstream" Incentives Program provides financial incentives to small commercial customers who implement approved energy efficiency modifications. Information is also provided through trade journals and associations and via Internet-based information to customers and vendors. Incentives are provided to motivate small commercial customers to implement projects that are identified through Small Commercial Customer Surveys and Audits Program. Incentives are offered to small commercial customers who might not improve the energy efficiency of their system or process without incentives, or whose needs are not met by standard performance contracting programs.

The market transformation plan is to first reduce the initial cost of certain energy-efficient technologies so that small commercial customers can afford to obtain first-hand experience with their energy savings and performance characteristics. The cumulative effect of an "educated" small commercial customer population is expected to increase the demand for energy efficient technologies. Ultimately, it is hoped that demand for targeted technologies can be satisfied and sustained by manufacturers, distributors, and contractors, without the need for external financial incentives.

Program Implementers and Affiliates: Utility staff, consultants, vendors, retailers
Customer/Building Type: Small (≤ 200 kW demand and ≤ 600,000 kWh annual consumption) and medium-size (> 1 million kWh annual consumption) commercial customers; all building types.
Energy End Uses: HVAC, lighting, refrigeration, process systems, and drive power (motors)
Energy End-Use Technologies: Electric technologies include: high-efficiency lamps, ballasts, exit signs, occupancy sensors, photocells, time clocks, packaged air conditioners, VFDs, window film, evaporative coolers, refrigerated cases, strip curtains, high-efficiency motors**,** variable-speed drives. Natural gas technologies include: building shell insulation, high-efficiency water heaters, boilers, cooking equipment, double-effect gas air conditioning, gas engines, and heat recovery systems.
Customer Geographic Area: All CEC climate zones

B. Market Transformation Characteristics

Market Event: Retrofit and equipment replacement
Market Barriers Addressed: Information costs/asymmetric information, performance uncertainties, hassle cost, product availability, organization practices or customs.
Market Barriers Not Addressed: Bounded rationality, access to or understanding of financing, misplaced or split incentives, inseparability of product features.
How is the market changing (if at all)? Utility "market characterization" and utility-sponsored market effects studies indicate some understanding of how goods are purchased in the small

[13] Note that for 1998 programs, "program" is the *combination* of similar utility-sponsored programs.

commercial retrofit market. Market share information is available from market effects studies sponsored by utilities and the California Demand-side Measure Advisory Committee (CADMAC).
Other Market Transformation Activities In or Outside California: Similar incentive programs have been in existence for a number of years throughout the United States.
Services Provided to Market Actors:
Small Commercial "Downstream" Incentives Program

	Services Provided to Market Actors								
Market Actor	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Labeling, Standards	Demon-stration	Project Assist-ance	3rd-Party Experts	Other:
Building Owners, Operators	Yes			Incentives					
Designer/Specifier									
Contractors	Yes								
Retailers									
Distributors									
Manufacturers									
Lending Agents									
Other:									

C. Indicators of Program Performance

Energy or Value Indicators: Projected first-year savings 57 GWh, 7.2 peak MW, 1,240,000 therms (utility projections based on past M&E studies); 15 year "program-weighted" measure lifetime. TRC tests were available for three out of four programs within this program group. Cost effectiveness as suggested by these TRC tests ranges from 1.00 (PG&E), 1.56 (SoCalGas), and 1.91 (SDG&E) with a program budget-weighted average TRC of 1.22.

Market Indicators: Information regarding sales of energy efficient equipment or services would be one indicator of success in terms of transforming the market for efficient equipment or services. Another indicator would be attitudes of key market actors reflecting the influence incentives have on purchasing decisions. According to PG&E's *1998 Second Quarter Status Report*, "customers continue to participate in the program, becoming familiar with selecting and using energy-efficient equipment." A commercial lighting market effects study by Xenergy/Easton for PG&E and SDG&E showed strong evidence for reductions in market barriers associated with high efficiency lighting (T-8 lamps and electronic ballasts) particularly with respect to utility-program participants, designers, installers, and distributors. The Xenergy study indicated continued price resistance among non-participants and small retail and office segments as well as resistance by manufacturers to completely switch over to electronic ballasts. The commercial and industrial energy efficiency program market effects study by Quantum Consulting for SCE, found the largest market effects for motors, and lesser market effects for lighting, but the remaining measures (HVAC, ASD and EMS) had no measurable market effects.
Program Activity Indicators: As of June 1998, SCE's Small Business Lighting Modification Program has reserved commitments representing an estimated 1,250 MWh. SCE recently mailed program brochures to 20,000 customers in the variety store, hotel/motel, restaurant, and grocery customer segments. To date, this mailing has produced 200 responses, and additional mailings to the same group are now under way. As of June 1998, PG&E's Express Efficiency program has saved 4 GWh, and its Website is receiving over 1500 hits per month. As of June 1998, SDG&E's Small Commercial Rebate Program had 33 HVAC contractors and 30 lighting contractors signed

up to participate in the program. As of June 1998, SoCalGas' Small Commercial Incentives Program is running at 100 percent of anticipated expenditures.

D. Program Assessment Information

Evaluation of Assumptions: Assumptions regarding sales of high efficiency equipment or attitudes of market actors regarding purchases of high efficiency equipment or services and how their decisions are affected by incentives should be evaluated before, during and after program operation. Some of these assumptions are described in the market effects studies by Xenergy/Easton and Quantum Consulting (see references).

Support for Market Transformation: Certain aspects of the long-run success of the Small Commercial "Downstream" Incentives Program have already been assessed in the market effects studies by Xenergy/Easton and Quantum Consulting. Other utility-sponsored and CADMAC-sponsored market effects studies (in progress) would be a good source for further information regarding support for market transformation.

Conditions for Altering or Withdrawing Program: According to Edison's October 1, 1997 Application Filing, the ultimate goal is that the market demand for energy efficient technologies can be satisfied and sustained by the manufacturing, distribution, and installation community without the need for external financial incentives. Two conditions for withdrawing the program are provided: (1) If unit sales of the energy efficient technologies addressed by the program design reach 33 percent of sales for their product class and targeted market segment; or (2) If knowledge and awareness of energy efficient technologies addressed by the program increases in the targeted market to 80 percent or "halfway to one hundred" (i.e., ½ (100% - percent in 1997) + percent in 1997) whichever is higher. Program activities in these market segments should then begin to ramp down when a clear trend toward either of the above conditions is noticed.

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Large Commercial/Industrial/Agricultural "Downstream" Incentives Program

A. Program[14] Description and Objectives

Program Administrator Area: Nonresidential
Program Budget: PY98 California PGC DSM Budget $8.1 million (Existing Utility Program)
Program Reporting Category: Commercial, Industrial, and Agricultural Energy Efficiency Incentives
Program Commitment: Single year
Program Description and Market Transformation Plan: The Large Commercial/Industrial/Agricultural (CIA) "Downstream" Incentives Program provides financial incentives to commercial, industrial, and agricultural customers who implement approved energy efficiency modifications. Information is also provided through trade journals and associations and via Internet-based information to customers and vendors. Incentives are provided to motivate large CIA customers to implement projects that are identified through Customer Surveys and Audits Program. Incentives are offered to large CIA customers who might not improve the energy efficiency of their system or process without incentives, or whose needs are not met by standard performance contracting programs. The incentives may be prescriptive or customized so that the size of the incentive depends on identified energy savings.

The program's market transformation plan is to increase the demand for energy efficient technologies so that the demand can be satisfied and sustained by manufacturers, distributors, and contractors without the need for external financial incentives.
Program Implementers and Affiliates: Utility staff, consultants, vendors, retailers
Customer/Building Type: Commercial (> 200 kW demand and/or > 600,000 kWh annual consumption), all industrial, all agricultural
Energy End Uses: HVAC, lighting, refrigeration, process systems, and drive power (motors)
Energy End-Use Technologies: Electric technologies include: high-efficiency lamps, ballasts, exit signs, occupancy sensors, photocells, time clocks, packaged air conditioners, chillers, cooling towers, VFDs, window film, evaporative coolers, refrigerated cases, strip curtains, high-efficiency motors**,** variable-speed drives, and process equipment for industrial and agricultural customers. Natural gas technologies include: high-efficiency furnaces, boilers, thermal fluid heaters, kilns, ovens, regenerative thermal oxidizers, and heat recovery systems.
Customer Geographic Area: all CEC zones

B. Market Transformation Characteristics

Market Event: Primary: retrofit and equipment replacement; secondary: new construction or renovation with Title-24
Market Barriers Addressed: Information costs/asymmetric information, performance uncertainties, hassle cost, organization practices or customs.
Market Barriers Not Addressed: Bounded rationality, access to or understanding of financing, misplaced or split incentives, inseparability of product features, and service or product unavailability

[14] Note that for 1998 programs, "program" is the *combination* of similar utility-sponsored programs.

How is the market changing (if at all)? Not available

Other Market Transformation Activities In or Outside California: The Northeast Energy Efficiency Partnership (NEEP) offers the *Premium Efficiency Motors Program,* which offers rebates and technical assistance to vendors and customers. Similar incentive programs have been in existence for a number of years throughout the United States.

Services Provided to Market Actors:

Large CIA "Downstream" Incentives Program

	Services Provided to Market Actors								
Market Actor	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Labeling, Standards	Demon-stration	Project Assist-ance	3rd-Party Experts	Other:
Building Owners, Operators	Yes			Incentives					
Designer/Specifier									
Contractors	Yes								
Retailers									
Distributors									
Manufacturers									
Lending Agents									
Other:									

C. Indicators of Program Performance

Energy or Value Indicators: Projected first-year savings 46.2 GWh, 7.8 peak MW, and 410,000 therms (utility projections based on past M&E studies); 15 year program-weighted measure lifetime. TRC tests were available for all three programs within this program group. Cost effectiveness as suggested by these TRC tests ranges from 1.10 (PG&E), 1.65 (SoCalGas), to 2.75 (SCE) with a program-budget-weighted average TRC of 1.82.

Market Indicators: Information regarding sales of efficient equipment or services would be one indicator of success in terms of transforming the market for efficient equipment or services. Another indicator would be attitudes of key market actors reflecting the influence incentives have on purchasing decisions. According to PG&E's 1998 Second Quarter Status Report, "customers continue to participate in the program, becoming familiar with selecting and using energy-efficient equipment." The *PG&E and SDG&E Commercial Lighting Market Effects Study* by Xenergy/Easton showed strong evidence for reductions in market barriers associated with high efficiency lighting (T-8 lamps and electronic ballasts) particularly with respect to utility-program participants, designers, installers, and distributors. The Xenergy/Easton study indicated continued price resistance among non-participants as well as resistance by manufacturers to completely switch over to electronic ballasts. The commercial and industrial energy efficiency program market effects study by Quantum Consulting for SCE, found the largest market effects for motors, and lesser market effects for lighting, but the remaining measures (HVAC, ASD and EMS) had no measurable market effects. The SCE *Hydraulic Services Program Market Effects Study* by RLW Analytics, Inc., showed strong evidence for market effects with participating customers and little evidence for market effects with non-participants. In addition, the RLW study indicated likely partial persistence of program impacts. However, persistence evaluation typically applies to long-term study of resource acquisition results (e.g. kWh savings) and it is has not yet been determined the relationship of such persistence to market effects.

Program Activity Indicators: As of June 1998, SCE's CIA "Downstream" Incentives Program

is almost fully subscribed. PG&E reported 4.0 million kWh saved as of June 1, 1998 and its Express Efficiency Website is receiving over 1,500 hits per month. As of June 1998, SoCalGas' Energy Efficiency Incentive Program is running at 75 percent of anticipated expenditures.

D. Program Assessment Information

Evaluation of Assumptions: Assumptions regarding sales of high efficiency equipment or attitudes of market actors regarding purchases of high efficiency equipment or services and how their decisions are affected by incentives should be evaluated before, during and after program operation. The evaluation should include tracking sales data and surveying customer attitudes. Some of these assumptions are described in the market effects studies by Xenergy/Easton, Quantum Consulting, and RLW Analytics (see references).

Support for Market Transformation: Certain aspects of the long-run success of the CIA "Downstream" Incentives Program have already been assessed in the market effects studies by Xenergy/Easton, Quantum Consulting, and RLW Analytics. Other utility-sponsored and CADMAC-sponsored market effects studies (in progress) would be a good source for further information regarding support for market transformation.

Conditions for Altering or Withdrawing Program: According to Edison's October 1, 1997 Application Filing, the ultimate goal is that the market demand for energy efficient technologies can be satisfied and sustained by the manufacturing, distribution, and installation community without the need for external financial incentives. Two conditions for withdrawing the program are provided: (1) If unit sales of the energy efficient technologies addressed by the program design reach 33 percent of sales for their product class and targeted market segment; or (2) If knowledge and awareness of energy efficient technologies addressed by the program increases in the targeted market to 80 percent or "halfway to one hundred" (i.e., ½ (100% - percent in 1997) + percent in 1997) whichever is higher. Program activities in these market segments should then begin to ramp down when a clear trend toward either of the above conditions is noticed.

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Nonresidential "Upstream" Package Air Conditioning Distributor Incentives

A. Program Description and Objectives

Program Administrator Area: Nonresidential
Program Budget: Estimated PY98 California PGC DSM Budget $800,000 (New PY98 Utility Program)
Program Category: Commercial Energy Efficiency Incentives
Program Commitment: Multi-year
Program Description and Market Transformation Plan: The Nonresidential "Upstream" Package Air Conditioning Incentives program provides financial incentives to distributors who sell qualifying package air conditioners (see CEE discussion below). The incentives take the form of rebates. The rebates cover much of the incremental cost, allowing distributors to sell high-efficiency air-conditioners for slightly more than standard units. The program also provides marketing materials to vendors in order to increase their use of energy efficiency as a marketing tool. There are a limited number of air-conditioning equipment distributors and manufacturers. This creates competitive pressure once initial participants are recruited.

The market transformation plan is based on increasing vendor and customer demand for package air conditioning equipment with energy-efficient features that will encourage more innovative product quality and changes in the number and "bundling" of product features. Program performance requirements consistent with national standards efforts (e.g., Consortium for Energy Efficiency) are expected to increase manufacturer attention on meeting upcoming standards (either program or regulatory). Increased demand spurred by improved information and incentives is hoped to eventually result in the production of a greater number and variety of energy-efficient products sold at lower prices. Market effects based on increased awareness and knowledge of energy-efficient products and their benefits are likely to need continual reinforcement until customers, vendors, and manufacturers can make changes in their organizational practices. Once these changes are institutionalized, they should sustain themselves for several years. Market effects sustainable in the long run are those that result in products with high quality and variety at lower costs.
Program Implementers and Affiliates: Utility representatives, air conditioning distributors
Customer/Building Type: All nonresidential, but with emphasis on commercial customers/office, retail, warehouse, and school buildings.
Energy End Uses: Space cooling
End Use Technologies, Services, Practices: High efficiency unitary (package) cooling equipment
Customer Geographic Area: All climate zones in central and northern California, with greater participation expected in hotter climates like the Central Valley.

B. Market Transformation Characteristics

Market Event: Primary equipment replacement, secondary new construction or renovation with Title-24
Market Barriers Addressed: Misplaced/split incentives, information/search costs, asymmetric information, performance uncertainties, hassle/transaction costs, product availability, organization

practices or customs, inseparability of product features
Market Barriers Not Addressed: Bounded rationality, access to or understanding of financing, irreversibility
How is the market changing if at all? Not available
Other Market Transformation Activities In (or Outside) of California: The Consortium for Energy Efficiency (CEE) *High-Efficiency Commercial Air-Conditioning Initiative* is to encourage the widespread use of high-efficiency unitary (single-packaged and split-system) central air conditioning and heat pump equipment that is commonly used in commercial buildings. The initiative's success stems from the efforts of several key utility partners who voluntarily adopt and promote common energy-efficiency specifications, or tiers, that are feasible but not yet widely used. The "Upstream" Packaged Air Conditioner Incentives Program uses the CEE energy-efficiency specifications.
Services Provided to Market Actors:
"Upstream" Package Air Conditioning Distributor Incentives

	Services Provided to Market Actors								
Market Actor	Information, Advertising, Websites	Train-ing & Tools	Linking Vendors and Customers	Financial Help	Alliances Labeling Standards	Demon-stration	Project Assist-ance	3rd-Party Experts	Other:
Building Owners, Operators	Yes								
Designer/ Specifier									
Contractors									
Retailers									
Distributors	Yes			Incentives					
Manufacturers									
Lending Agents									
Others:									

C. Indicators of Program Performance

Energy or Value Indicators: Estimated first-year savings are 4 GWh and 1 MW (estimated[15] based on reported load impacts); 15 year "program-weighted" measure lifetime. The TRC for this program is 1.00.
Market Indicators: According to PG&E's *Second Quarter Status Report*, package air-conditioner distributors are reporting that vendors are "shopping around" to find distributors who are participating in the program and thus able to offer a price break on high efficiency units. Distributors are selling more energy efficient units, as evidenced by the number of incentive applications.
Program Activity Indicators: As of June 1998, package AC distributors have applied for 8,458 tons worth of incentives (136% of the 1997 customer incentive accomplishment). An increased number of distributors are signing up because their competitors are already participating. Twenty-five vendor and distributor seminars and numerous customer seminars have been held to introduce the program. Several issues of the Trade Ally newsletter explaining and promoting the program have been mailed out to vendors and distributors.

[15] Estimate based on this program's share of program spending times total efficiency incentive program load impact.

D. Program Assessment Information

Evaluation of Assumptions: One key assumption is that prior to the program, air conditioning equipment distributors did not stock a high percentage of premium efficiency equipment. This assumption can be assessed using sales data.

Support for Market Transformation: Observations regarding distributor rebate applications can be used to assess support for market transformation in the short-term. Observations regarding sales of high-efficiency packaged air-conditioners can be used to assess support for market transformation in the long-term. The long-term goal of changing stocking (and manufacturing) practices cannot be judged after one year.

Conditions for Altering or Withdrawing Program: The program may need to be altered if incentives are too low to offset the additional cost of high-efficiency units. The program can be phased out when competitive pressures cause distributors to stock only high efficiency package air-conditioners.

References:

Pacific Gas and Electric Company. *Application of Pacific Gas and Electric Company for Approval of 1998 Energy Efficiency Programs, Shareholder Incentive Mechanism for 1998 Programs, as Cost Accounting Process for Transfer of Surcharge Funds, and Update of Energy Efficiency Commitments*. San Francisco, CA. October 1997.

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Pacific Gas & Electric Company. *PG&E Second Quarter Status Report.* San Francisco, CA. July 1998.

Consortium for Energy Efficiency. *High-Efficiency Commercial Air-Conditioning Initiative*. URL:http://www.ceeformt.org. 1998.

Nonresidential "Upstream" Motors Incentives

A. Program[16] Description and Objectives

Program Administrator Area: Nonresidential
Program Budget: Estimated PY98 California PGC DSM Budget $1.2 (New PY98 Utility Program)[17], NEEA Funding is $387,500 per year over two years
Program Category: Commercial Energy Efficiency Incentives, Industrial Energy Efficiency Incentives
Program Commitment: Single-year
Program Description and Market Transformation Plan: The "Upstream" Motor Incentives Program includes elements of California utility-sponsored programs as well as elements of programs outside California sponsored by the Northwest Energy Efficiency Alliance (NEEA) and the Consortium for Energy Efficiency (CEE). The California utility-sponsored programs provide education and financial incentives to motors vendors (and, in the case of one California utility, nonresidential customers) for selling or purchasing premium efficiency motors.

The market transformation plan aims to increase vendor and customer demand for premium efficiency motors. The program works with vendors to encourage stocking of premium efficiency motors. If vendors are educated about how to market premium efficiency motors, then customers will be more likely to purchase them, particularly for emergency replacement. The mid-term goal is to raise the standard for premium efficiency motors that exceed the EPACT standards. Motivating vendors to stock premium efficiency motors will stimulate manufacturers to increase production, and this will yield lower prices. Once these changes are institutionalized, they should be self-sustaining.
Program Implementers and Affiliates: Utility representatives, motor vendors, distributors, consultants
Customer/Building Type: Customers: commercial and industrial; Building Types: manufacturing and other industrial buildings.
Energy End Uses: Drive power (motors)
End Use Technologies, Services, Practices: Premium efficiency motors (beyond EPACT standards)
Customer Geographic Area: All CEC climate zones

B. Market Transformation Characteristics

Market Event: Equipment replacement, retrofit
Market Barriers Addressed: Information/search costs, asymmetric information, performance uncertainties, hassle/transaction costs, product availability, organizational practices or customs, irreversibility, inseparability of product features
Market Barriers Not Addressed: Bounded rationality, misplaced/split incentives, access to or understanding of financing
How is the market changing if at all? Initial feedback from motor vendors indicates that they are working with manufacturers to allow them to return the EPACT motors and exchange them for the "premium" efficiency motors which qualify for incentives. One major motor manufacturer

[16] Note that for 1998 programs, "program" is the *combination* of similar utility-sponsored programs.
[17] PY98 California PGC DSM Budget based on $700,000 for PG&E and $495,000 for SDG&E.

(Baldor) recently announced that it selected CEE's Premium Efficiency levels for its complete line of highest efficiency motors specifically because many ratepayer-funded programs promoting high efficiency use the CEE premium efficiency specification (CEE 1998).

Other Market Transformation Activities in (or Outside) California: The Consortium for Energy Efficiency (CEE) promotes premium efficiency motor specifications and educational information. The "Upstream" Motors Incentives Program uses the CEE specifications. The Northwest Energy Efficiency Alliance (NEEA) *Premium Efficiency Motors Program* builds on a previous NEEA project that encouraged the stocking and sale of premium efficiency motors, through financial incentives to motor dealers, motor testing and circuit riders. NEEA aims to institutionalize energy-efficient motor practices among companies with substantial motor loads, specifically those that use high-horsepower models and buy motors in large volumes. These firms, although small in number, account for a sizable percentage of the region's motor horsepower. The NEEA program focuses on changing internal customer policies so energy efficiency becomes a standard consideration for the purchase, maintenance and repair of motors. The NEEA strategy-which will be refined through market research-will center on comprehensive motor-management services for targeted customers. Among the potential services are sample procurement policies, motor analysis tools, motor repair guides and specifications, case studies, on-site motor testing, staff training and various other forms of information. The Alliance venture will emphasize the many benefits of energy-efficient motors, including lower operating costs, greater reliability and reduced production downtime.

Services Provided to Market Actors:

"Upstream" Motor Efficiency Incentives

	Services Provided to Market Actors								
Market Actor	Information, Advertising, Websites	Train-ing & Tools	Linking Vendors and Customers	Financial Help	Alliances Labeling Standards	Demon-stration	Project Assist-ance	3rd-Party Experts	Other:
Building Owners, Operators	Yes			Point of sale discounts	Yes				
Designer/ Specifier									
Contractors									
Retailers	Yes	Yes		Incentives					
Distributors				Stocking & handling incentives					
Manufacturers					Yes				
Lending Agents									
Others:									

C. Indicators of Program Performance

Energy or Value Indicators: Projected 1st year savings are 3.1 GWh (based on projections of past programs and M&E studies); 15 year program-weighted measure lifetime. TRC tests were available for both programs within this program group. Cost effectiveness as suggested by these TRC tests ranges from 0.44 (PG&E) to 1.91 (SDG&E) with a program-budget-weighted average TRC of 1.05.

Market Indicators: One indicator is the extent to which motor vendors are returning EPACT motors to the manufacturers and exchanging them for "premium" efficiency motors which qualify for incentives. Baldor Motor and Drives recently announced that it selected CEE's Premium

Efficiency levels for its complete line of highest efficiency motors specifically because utility-funded programs promoting high efficiency use the CEE premium efficiency specification (CEE 1998).

Program Activity Indicators: As of June 1998, SDG&E had 43 motor vendors participating in the program, which was implemented on March 28, 1998. Program expenditures were lower than expected because of a delay in program implementation. As motor dealers increase their inventories of efficient products that exceed EPACT standards, spending and participation are expected to increase and fall in-line with year-end expectations. No specific milestones are available for PG&E since upstream motors incentives are part of a larger incentives program. No program activity information is available for NEEA or CEE.

D. Program Assessment Information

Evaluation of Assumptions: One key assumption is that prior to the program, vendors stocked motors that just met the EPACT standards.

Support for Market Transformation: Support for market transformation could be provided by assessing (perhaps through pre-/post surveys) the number of vendors that permanently switch to premium efficiency motors as a result of the program or the increase in share of premium efficient motors they sell.

Conditions for Altering or Withdrawing Program: The program may need to be altered if incentives are not high enough to offset the additional cost of premium efficiency motors. The program can be phased out when competitive pressures indicate that vendors are stocking sustainable levels of premium efficiency motors.

References:

Consortium for Energy Efficiency. *Comments from the Consortium for Energy Efficiency, Inc. to the California Board for Energy Efficiency Re: 1999 Planning for Market Transformation.* August, 1998.

Pacific Gas and Electric Company. *Application of Pacific Gas and Electric Company for Approval of 1998 Energy Efficiency Programs, Shareholder Incentive Mechanism for 1998 Programs, as Cost Accounting Process for Transfer of Surcharge Funds, and Update of Energy Efficiency Commitments*. San Francisco, CA. October 1997.

Pacific Gas & Electric Company. *1998 Customer Energy Efficiency Programs, Advice Filing 2086-G/1776-E, Attachments.* San Francisco, CA. June 1998.

Pacific Gas & Electric Company. *PG&E Second Quarter Status Report.* San Francisco, CA. July 1998.

San Diego Gas and Electric Company. *Testimony of Yolanda A. Whiting Before the Public Utilities Commission of the State of California*. San Diego, CA. October 1997.

San Diego Gas and Electric Company. *Advice 1104-E/1100-G 1998 Energy Efficiency Program Plans and Budgets.* San Diego, CA. June 1998.

San Diego Gas and Electric Company. *1998 Second Quarter Program Status Update*. San Diego, CA. July 1997.

Northwest Energy Efficiency Alliance. *Premium Efficiency Motors*. URL:http://www.nwalliance.org. 1998.

Consortium for Energy Efficiency. *Motors Standards Development and Education*. URL: http://www.ceeformt.org. 1998.

Nonresidential "Upstream" LED Exit Sign Incentives

A. Program Description and Objectives

Program Administrator Area: Nonresidential
Program Budget: PY98 California PGC DSM Budget $1.8 million (New PY98 Utility Program)
Program Category: Commercial Energy Efficiency Incentives
Program Commitment: Single-year
Program Description and Market Transformation Plan: The purpose of the "Upstream" LED Exit Sign Incentives Program is to encourage installation of new and retrofit high efficiency LED exit signs in small businesses. The program provides participating LED exit sign manufacturers a wholesale cost reduction incentive per qualifying LED exit sign to lower shelf price. The participating manufacturer will pass the full incentive amount plus any manufacturer's incentive-matching allowance and other promotion through to the final distributor. The distributor, in turn, will apply a normal price mark-up percentage to the reduced cost from the manufacturer resulting in a significant price reduction to the customer. Historically, customers purchasing exit signs generally selected off-the-shelf models without regard to energy efficiency. If choices are available, the higher incremental cost of the energy efficient models discourages their purchase.

The market transformation plan assumes that if high-efficiency units are offered for sale at a low price that consumers will by LED exit signs. The incentive program also gives the distributor's sales staff, who are the channels between manufacturers and consumers of LED exit signs, an opportunity to learn more about the product and to develop the ability to sell the features of the product more effectively. Ultimately, an educated consumer and sales populace is expected to enable the product to be sold in greater numbers without artificial price incentives.
Program Implementers and Affiliates: Utility staff, manufacturers, distributors, EPA/DOE Energy Star
Customer/Building Type: Small commercial customers
Energy End Uses: Lighting exit signs
End Use Technologies, Services, Practices: LED exit signs
Customer Geographic Area: Southern California (SCE territory)

B. Market Transformation Characteristics

Market Event: Planned replacement, emergency replacement
Market Barriers Addressed: Misplaced/split incentives, information/search costs, asymmetric information, performance uncertainties, hassle/transaction costs, product availability, organizational practices or customs
Market Barriers Not Addressed: Bounded rationality, access to or understanding of financing
How is the market changing if at all? Not available.
Other Market Transformation Activities in (or Outside) California: Northwest Energy Efficiency Alliance (NEEA) had a similar program in prior years.

Services Provided to Market Actors:
Nonresidential "Upstream" LED Exit Sign Incentives

Market Actor	Services Provided to Market Actors								
	Information, Advertising, Websites	Train-ing & Tools	Linking Vendors and Customers	Financial Help	Alliances Labeling Standards	Demon-stration	Project Assist-ance	3rd-Party Experts	Other:
Building Owners, Operators	Yes				Labeling				
Designer/ Specifier									
Contractors									
Retailers									
Distributors	Yes			Promotional allowances					
Manufacturers				Wholesale cost reduction					
Lending Agents									
Others:									

C. Indicators of Program Performance

Energy or Value Indicators: Projected 1st year savings are 12.8 GWh. The TRC for this program is 1.00.
Market Indicators: SCE reports great distributor interest in the program, as LED exit sign distributor purchase prices may be reduced by nearly 70%.
Program Activity Indicators: Of 36 manufacturers solicited, 8 responded with proposals and have received purchase orders from SCE that allow them to bill SCE for price reductions once signs are shipped to distributors.

D. Program Assessment Information

Evaluation of Assumptions: This program assumes that consumers choose largely based on price. This should be checked to evaluate the necessity of passing on the manufacturer discount entirely onto the distributor. If consumers also choose based on availability or the advice of their distributor, or if availability of products to the distributor are affected by manufacturer costs or production levels, the incentive may have to be split between the market actors.
Support for Market Transformation: No information available at this time.
Conditions for Altering or Withdrawing Program: The program could be withdrawn when it becomes clear that market actors will continue installation of LED exit signs without PGC support. This situation is estimated to occur when over half of the target customers in the SCE service territory purchase the program's highly energy-efficient models through traditional and/or new distribution channels and when participating distributors indicate a likelihood that they will continue to offer this service to their customers.

References:

Southern California Edison, *Appendix B to the Testimony of Southern California Edison in Support of the 1998 DSM Program Funding*. Rosemead, CA. October 1997.

Southern California Edison Company. *Extension of 1998 Energy Efficiency Program Plans and*

Performance Award Mechanisms. Rosemead, CA. June 1998.

Southern California Edison. *1998 Energy Efficiency Programs Quarterly Report, Second Quarter*. July 1998.

Implementation Assistance Program

A. Program[18] Description and Objectives

Program Administrator Area: Nonresidential Retrofit
Program Budget: PY98 California PGC DSM Budget $1.25 million (Existing Utility Program)
Program Reporting Category: Nonresidential Other
Program Commitment: multi-year
Program Description and Market Transformation Plan: The Implementation Assistance Program (IAP) provides project management, energy audits, feasibility studies, bid specification and evaluation, financing, construction management, and other services customers need to complete energy-efficiency retrofit projects. Customers repay the utility for the service. Services may be provided by utility staff or through third parties, and are offered primarily to public-sector (e.g., local or federal government, schools) and large commercial customers, though small business customers are eligible. Federal agencies are under executive orders to meet mandated energy efficiency goals. The Energy Policy Act (EPACT) of 1992 allows federal agencies to participate in utility DSM programs financed with anticipated future savings. EPACT targets all federal sectors, including government-owned office buildings, education institutions, hospitals, military bases, and correctional facilities.

The IAP serves customers that either value services more than financial incentives or do not have the resources or expertise to do the project themselves. Initial participation in PG&E's programs has been largely schools (under PG&E's previous Tailored Energy Planning Assistance Program) and various levels of government (under PG&E's previous Tailored Energy Planning Assistance Program and PowerPact Program). SoCal Gas' Energy Edge program is working with small business customers. Customers implementing these pilot programs have a close relationship with utility that coordinates services through third parties. Ultimately, the utility can step back from the process and let the customer and third party work together directly or with more limited assistance from the utility. The exception to this is when utilities are working with the Federal Government under a legislative provision that is not transferable to the new administrator.
Program Implementers and Affiliates: Utility representatives, consultants, engineering firms
Customer/Building Type: Customers: Building Types: all building types, but emphasis on schools and government-owned office buildings, educational institutions, hospitals, military bases, and correctional facilities
Energy End Uses: HVAC, lighting, refrigeration, miscellaneous
End-Use Technologies, Services, Practices: High-efficiency HVAC and lighting.
Customer Geographic Area: All CEC climate zones

B Market Transformation Characteristics

Market Event: Retrofit and equipment replacement
Market Barriers Addressed: Access to financing, hassle/transaction costs, organizational practice or custom, information/search costs, asymmetric information, access to or understanding of financing, service or product unavailability
Market Barriers Not Addressed: Performance uncertainties, misplaced or split incentives, inseparability of product features

[18] Note that for 1998 programs, "program" is the *combination* of similar utility-sponsored programs.

How is the market changing (if at all)? Not available

Other Market Transformation Activities In or Outside California: PG&E's Tailored Energy Planning Assistance (TEPA) program which started in 1996 successfully used a similar approach for implementing large commercial and institutional retrofit projects, but the emphasis has now switched to new construction. The Consortium for Energy Efficiency (CEE) *Federal Procurement Support* provides energy efficiency information to federal government purchasing agencies. Government Agencies have had limited success in getting projects under contract. Recently some military bases have contracted with DOD-approved ESCOs to move ahead with projects in California.

Services Provided to Market Actors:

Implementation Assistance Program

	Services Provided to Market Actors								
Market Actor	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Labeling, Standards	Demon-stration	Project Assist-ance	3rd-Party Experts	Other: Project Manage-ment
Building Owners, Operators							Yes		Receive
Designer/Specifier									Provide
Contractors									
Retailers									
Distributors									
Manufacturers									
Lending Agents				Provide financing					
Other:									

C. Indicators of Program Performance

Energy or Value Indicators: Energy impacts were only provided for SoCal Gas' Energy Edge program. Projected first year savings are 120 MWh and 1,000 therms. This program has a TRC of 3.1.

Market Indicators: Not available

Program Activity Indicators: As of June 1998, SoCalGas's Energy Edge program had signed contracts with four customers and had contracts pending with twenty additional small business customers. This was a larger number than expected, so the maximum funding for individual projects was reduced to $20,000 in order to serve more customers. PG&E completed feasibility studies for the US Navy at Monterey, GSA in San Francisco and San Bruno. Phase II of the 450 Golden Gate project which included the 1st large scale demonstration of BACnet was completed under the PowerPAct program. PG&E entered into contracts with the U.S. Postal Service to start with four lighting retrofit projects under the PowerPact Program and is in the process of negotiating multiple other projects with the Post Office.

D. Program Assessment Information

Evaluation of Assumptions: not available

Support for Market Transformation: The IAP can be assessed by considering: number of projects that are undertaken or the square footage impacted; program cost-effectiveness; percentage of projects that utilize integrated designs; changes in government project specification and design practices; and use of successful project results in future projects. No methods for

collecting such data are provided.

Conditions for Altering or Withdrawing Program: Both programs require participant co-funding. PGC funding can be gradually reduced as Federal government business managers and vendors who serve them become more aware of energy-efficient technologies. However, the existing contractual arrangement between PG&E and the federal government which allows PG&E to provide energy efficiency services on a delivery order basis through the PowerPact program cannot (by law) be assigned to any third parties, including the new PGC Administrator. Thus, in the absence of PowerPAct, the federal government will have to revert to its traditional (e.g., slow and expensive) process of implementing projects.

References:

Pacific Gas and Electric Company. *Application of Pacific Gas and Electric Company for Approval of 1998 Energy Efficiency Programs, Shareholder Incentive Mechanism for 1998 Programs, as Cost Accounting Process for Transfer of Surcharge Funds, and Update of Energy Efficiency Commitments.* San Francisco, CA. October 1997.

Pacific Gas and Electric Company. William Miller and Terrance Pang. "PG&E Energy Efficiency Program Supplemental Information." San Francisco, CA August 1998.

Southern California Gas Company. *Application of Southern California Gas Company*. Los Angeles, CA. October 1997.

Southern California Gas Company. *1998 Energy Efficiency Program Plans and Budgets*. Los Angeles, CA. June 1998.

Southern California Gas Company. *Second Quarter Program Review*. Los Angeles, CA. July 1998.

Consortium for Energy Efficiency. *Federal Procurement Support*. Washington, DC. 1998.

LED Traffic Signals Standards Program

A. Program Description and Objectives

Program Administrator Area: Nonresidential
Program Budget: PY98 California PGC DSM Budget $205,000 (New PY98 Utility Program)
Program Reporting Category: Nonresidential other
Program Commitment: 3-4 years
Program Description and Objectives: The LED Traffic Signals Standards Program aims to help make red, green and yellow Light Emitting Diodes (LEDs) more widely used in traffic lights. Specifically, the program will focus on easing concerns over the service life of red LEDs, and demonstrating the potential of green and yellow LEDs.

The market transformation plan has two components: (1) independent, creditable verification of the service life of red LEDs, leading to their wider application and increased market penetration, and (2) revised federal, state, and local standards allowing for the installation of available green and yellow LED lamps in traffic signals and signs, leading to their specification and use.
Program Implementers and Affiliates: Utility staff, government
Customer/Building Type: Customer: Municipal
Energy End Uses: Traffic lighting
End Use Technologies, Services, Practices: LED traffic lights
Customer Geographic Area: All California climate zones

B. Market Transformation Characteristics

Market Event: Primary: retrofit; secondary: new construction
Market Barriers Addressed: Organizational practices or customs, performance uncertainties, information or search costs, asymmetric information or opportunism, access to or understanding of financing, inseparability of product features, and service or product unavailability
Market Barriers Not Addressed: Hassle or transaction costs, bounded rationality, misplaced or split incentives
How is the market changing (if at all)? LEDs currently have a very low penetration in the traffic light market.
Other Marketing Activities In or Outside of California: The Consortium for Energy Efficiency (CEE) *LED Traffic Signals Evaluation* is a White Paper to inform utilities about issues and potential savings from LED traffic lights and help the CEE decide how to best approach this market.

Services Provided to Market Actors:
LED Traffic Signals Standards Program

Market Actor	Services Provided to Market Actors								
	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Labeling, Standards	Demon-stration	Project Assist-ance	3rd-Party Experts	Other: Standards assist finding financing
Owners, Operators	Yes				Labeling				
Designer/Specifier									
Contractors									
Retailers									
Distributors									
Manufacturers					Labeling				
Lending Agents									
Other: Municipal Governments					Standards				Yes

C. Indicators of Program Performance

Energy or Value Indicators: PG&E estimates that traffic signals in their service territory alone consume 40,000 MWh per year – a number that could be reduced by 50-75% if LED traffic signals were universally adopted. Red LEDs are already being installed in large numbers due to large potential energy and maintenance savings. Given the low cost of the standards development and lifetime testing, there is a strong indication that this program will be cost effective.

Market Indicators: Prices for the red LEDs have already experienced a dramatic reduction. New manufacturers for the green LEDs have entered the market. This should help to drive down costs. Several municipalities and CalTrans are already using LEDs, even in the absence of an ITE specification.

Program Activity Indicators: Milestones for 1998 include initiating a research contract with a lighting laboratory, holding a workshop, and initiating work. A workshop was conducted at PG&E's Pacific Energy Center in June, 1998. An effort was initiated to provide additional research on the link between codes and specifications, and visibility/response time. Participants are evaluating the current specifications and may encourage the Institute of Traffic Engineers (ITE) to consider a revision to the current ANSI Standard that lowers the lighting intensity requirement.

D. Program Assessment Information

Evaluation of Assumptions: Tracking the number of cities deciding to upgrade their traffic signals to LEDs is probably the best indicator of success. This information can be obtained from municipal traffic engineering departments and manufacturers of LED traffic signals who sell the LED traffic signals.

Support for Market Transformation: The strongest evidence for market transformation will be the adoption of standards by such organizations as CalTrans and the Institute of Traffic Engineers which allow for green and yellow LEDs. It is likely that it will take 3-4 years to achieve this goal.

Conditions for Altering or Withdrawing Program: If it is determined that yellow and green LEDs are simply not yet able to meet the safety and visible acuity requirements in existing traffic signal requirements, then it may be too soon make a push for those technologies. This assessment

could be made 1-2 years into the project. If red, yellow, and green LEDs become fully accepted in the market, then this program would no longer be necessary.

References:

Pacific Gas & Electric Co., *Application of Pacific Gas and Electric Company for Approval of 1998 Energy Efficiency Program, Shareholder Incentive Mechanism for 1998 Programs, a Cost Accounting Process for Transfer of Surcharge Funds, and Update of Energy Efficiency Commitments,* San Francisco, CA, 1997.

Pacific Gas & Electric Co., *1998 Customer Energy Efficiency Programs, Advice Filing 2086-G/1776-E, Attachments.* San Francisco, CA, June 1998.

Pacific Gas & Electric Company. *PG&E Second Quarter Status Report.* San Francisco, CA. July 1998.

Consortium for Energy Efficiency (CEE). *LED Traffic Signals Evaluation*. CEE. 303 Congress Street, Suite 600, Boston, MA. URL:http://www.ceeformt.org. 1998.

Hotel and Motel Efficient Technologies Demonstration Program

A. Program Description and Objectives

Program Administrator Area: Nonresidential
Program Budget: PY98 California PGC DSM Budget $140,000 (New PY98 Utility Program)
Program Reporting Category: Nonresidential other
Program Commitment: Three years
Program Description and Market Transformation Plan: In the major hotel industry, design, aesthetics and guest comfort are the main interests, not energy savings. PG&E's traditional cash rebate program has not had an impact on energy efficient lighting conversions in this industry because their primary driver has been the quality of lighting, not energy savings. Installation of a variety of lighting equipment throughout their facilities, from meeting rooms, banquet rooms, lobbies, hallways and guest rooms, allows them to test a variety of products over an extended period of time. These demonstrations have proven to the key decision makers that they do not need to compromise guest comfort and aesthetics by converting to energy efficient lighting. Lighting technologies include compact fluorescents, LED exit signs and motion sensors. The program also demonstrates terminal unit air conditioners, ice and vending machines, and laundry facilities. The program provides financing where necessary. Efforts are focused on six major hotel and motel chains.

The market transformation plan is to cause a significant increase in the penetration of the target technologies such as CFLs, LED exit signs, and motion sensors as a result of direct educational work with top management and strategic demonstrations.
Program Implementers and Affiliates: Consultants, utility staff
Customer/Building Type: Customers: Large and medium commercial; Building Type: hotels and motels
Energy End Uses: Primarily lighting, HVAC, refrigeration, laundry
End Use Technologies, Services, Practices: High efficiency lighting including dimmable CFLs, CFLs with reflectors to replace "R" lamp downlights, three-way circline replacements for table lamps, LED exit signs, high efficiency terminal unit air conditioners, ice machines, vending machines, green plugs, and horizontal axis clothes washers
Customer Geographic Area: Central and Northern California

B. Market Transformation Characteristics

Market Event: Retrofit w/o Title 24
Market Barriers Addressed: Organizational practices or customs, information or search costs, performance uncertainties, bounded rationality, access to or understanding of financing, asymmetric information or opportunism.
Market Barriers Not Addressed: hassle or transaction costs, misplaced or split incentives, inseparability of product features, and service or product unavailability
How is the market changing (if at all)? According to PG&E, large hotel and motel chains do not consider energy efficient lighting in purchasing decisions due to a focus on low first cost. This is especially true with incandescent lighting and exit signs in rooms and common areas.
Other Market Transformation Activities In or Outside of California: None identified

Services Provided to Market Actors:
Hotel and Motel Efficient Technologies Demonstration Program

	Services Provided to Market Actors								
Market Actor	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Labeling, Standards	Demon-stration	Project Assist-ance	3rd-Party Experts	Other:
Building Owners, Operators	Yes			Yes		Yes			
Designer/Specifier									
Contractors									
Retailers									
Distributors									
Manufacturers									
Lending Agents									
Other:									

C. Indicators of Program Performance

Energy or Value Indicators: Twenty five thousand hotels and motels in California represent a significant use of energy. Six major chains represent the best opportunity for transformation. According to PG&E, the estimated kWh savings potential in this segment is large. As an example, PG&E estimates that when one large hotel converts to energy efficient lighting, the annual savings is 3,000,000 kWh.

Market Indicators: The president of the San Francisco Hotel Council agreed to promote the program to over 60 key member hotels. The California Hotel Motel Association has requested that PG&E make presentations at their 1998 annual Convention in San Francisco to discuss successes with energy efficient hotel/motel lighting projects. It is too early to see any evidence of sustainability.

Program Activity Indicators: PG&E is currently pursuing contracts with two consulting firms for support with analysis of hotel and motel lighting systems. Consultants will assist in determining potential energy efficiency recommendations. Further work will be performed by consultants in the measurement and verification of installations. Program is developed and has been presented to numerous potential customers. These customers include large San Francisco independent hotels as well as several large hotel chains. A total of thirteen potential customer sites have been identified. These sites include major chain hotels such as Marriott, Hyatt, etc. All have potential for conversion to compact fluorescent lamps and have expressed interest in the program.

D. Program Assessment Information

Evaluation of Assumptions: Surveys of purchasing agents and facilities management at major hotel and motel chains will provide an indication of success in terms converting incandescent fixtures and exit signs to CFLs, LED exit signs, and motion sensors.

Support for Market Transformation: Success would be realized by the widespread adoption of energy efficiency measures in the target market. Market transformation will be gauged by the degree to which the market continues to implement the measures once the program ends. Market surveys could be used to gather these data. However, it would be difficult to isolate the effects caused by this program as opposed to those caused by other market transformation programs.

Conditions for Altering or Withdrawing Program: If the program is unable to establish relationships with hotel/motel chains, a new approach will be necessary. Once relationships have

been established and demonstration projects are being carried out, it will be important to determine whether non-participating hotels and motels are implementing measures. This assessment should not occur more frequently than once a year, as it will take at least that long to test the strength of relationships and to allow measures to trickle down to other hotels and motels.

References:

Pacific Gas and Electric Company. *Application of Pacific Gas and Electric Company for Approval of 1998 Energy Efficiency Programs, Shareholder Incentive Mechanism for 1998 Programs, as Cost Accounting Process for Transfer of Surcharge Funds, and Update of Energy Efficiency Commitments*. San Francisco, CA. October 1997.

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Pacific Gas & Electric Company. *PG&E Second Quarter Status Report.* San Francisco, CA. July 1998.

Pacific Gas and Electric Company. William Miller and Gary Fernstrom. "PG&E Energy Efficiency Program Supplemental Information." San Francisco, CA August 1998

Lighting Controls Demonstration Program

A. Program Description and Objectives

Program Administrator Area: Nonresidential
Program Budget: PY98 California PGC DSM Budget $570,000 (New PY98 Utility Program)
Program Report Category: Nonresidential Other
Program Commitment: Two years
Program Description and Objectives: The Lighting Controls Program works to integrate lighting controls into lighting standards, design tools, specifying practices and calibration procedures. It includes occupancy sensors and daylight photosensor systems. Market transformation will be accomplished through nine main strategies: providing product information, developing application guides, working with manufacturers to establish product testing protocols, integrating controls into simulation tools, developing performance specifications, developing calibration procedures, fostering changes in building code standards, educating design professionals, and doing case studies and demonstration projects.
Program Implementers and Affiliates: Consultants, utility staff
Customer/Building Type: Commercial and industrial (all sizes) - offices, schools, stores, research and manufacturing facilities, hospitals, warehouses, hotels, and motels
Energy End Uses: Lighting
End Use Technologies. Services, Practices: Controls
Customer Geographic Area: California urban areas

B. Market Transformation Characteristics

Market Event: Primary: retrofit w/o invoking Title 24; secondary: new construction
Market Barriers Addressed: Organizational practices or customs, performance uncertainties, information or search costs, and service or product unavailability
Market Barriers Not Addressed: Hassle or transaction costs, asymmetric information or opportunism, bounded rationality, access to or understanding of financing, misplaced or split incentives, and inseparability of product features
How is the market changing (if at all)? Not available
Other Market Transformation Activities In or Outside of California: None identified
Services Provided to Market Actors:
Lighting Controls Demonstration Program

	Services Provided to Market Actors								
Market Actor	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Labeling, Standards	Demon-stration	Project Assist-ance	3rd-Party Experts	Other:
Building Owners, Operators	Yes					Yes			
Designer/Specifier	Yes	Yes							
Contractors									
Retailers									
Distributors									
Manufacturers					Provide standards, protocols				
Lending Agents									
Other:									

C. Indicators of Program Performance

Energy or Value Indicators: Not available.

Market Indicators: Formal studies of market indicators are not available, but PG&E reports that manufacturers of the products being tested have been very cooperative in providing their products for testing and are enthusiastic about receiving the test results.

Program Activity Indicators: Milestones include background conducting research to determine the existing state of lighting controls technology, conducting laboratory research to develop a protocol for lighting control equipment, and testing existing lighting control technology, and developing a database of control equipment. As of June, 1998 PG&E reported a contract had been signed and work started at the Lighting Research Center (LRC) of Rensselaer Polytechnic Institute. Several program meetings have been held with LRC staff in California and in New York.

D. Program Assessment Information

Evaluation of Assumptions: Not available

Support for Market Transformation: Tracking activities such as adoption of testing protocols, product testing, product calibration, and commissioning standards will help to determine the degree to which the optimized systems are actually in use. There will not be enough data to carry out a proper analysis until a year after program completion. It may be difficult to find M&V results from projects that are suitable for comparison to new projects; this may make evaluation difficult.

Conditions for Altering or Withdrawing Program: Not available.

References:

Pacific Gas and Electric Company. *Application of Pacific Gas and Electric Company for Approval of 1998 Energy Efficiency Programs, Shareholder Incentive Mechanism for 1998 Programs, as Cost Accounting Process for Transfer of Surcharge Funds, and Update of Energy Efficiency Commitments*. San Francisco, CA. October 1997.

Pacific Gas & Electric Company. *1998 Customer Energy Efficiency Programs, Advice Filing 2086-G/1776-E, Attachments.* San Francisco, CA. June 1998.

Pacific Gas & Electric Company. *PG&E Second Quarter Status Report.* San Francisco, CA. July 1998.

Pacific Gas and Electric Company. William Miller and Don Felts. "PG&E Energy Efficiency Program Supplemental Information." San Francisco, CA August 1998.

Daylighting Productivity Study

A. Program Description and Objectives

Program Administrator Area: Nonresidential
Program Budget: $228,000 (3rd-Party and Out-of-State Programs)
Program Reporting Category: Nonresidential Other
Program Commitment: Single year
Program Description and Objectives: The Daylighting Productivity Study examines the correlation between daylighting and productivity in commercial buildings using input and guidance from daylighting professionals. Work is coordinated with the Skylighting Collaborative made up of members of manufacturers of skylighting products, daylighting controls, and dimming ballasts. This ensures that all results are directly useful to the skylighting industry. Results from the study are being disseminated through a variety of channels.

The market transformation plan is to generate quantifiable data on the relationship between daylighting and productivity, and then to disseminate that information to both the design and the building operator community. The objective is to provide designers, building owners, and end users with information to make them feel more comfortable with daylighting options in their buildings. The program plan involves interaction with various market actors at several steps along the way, including study design and market research to determine how best to present the findings from the study to the general public.
Program Implementers and Affiliates: Consultants, utility staff,
Customer/Building Type: Customer: Commercial, Industrial, Building Type: small and medium office, restaurant, retail, grocery, warehouse, school.
Energy End Uses: Lighting
End Use Technologies, Services, Practices: Skylights, dimming ballasts, lighting controls
Customer Geographic Area: Central and Northern California

B. Market Transformation Characteristics

Market Event: Primary: retrofit; secondary: new construction
Market Barriers Addressed: Organizational practices or customs, performance uncertainties, information or search costs, asymmetric information or opportunism
Market Barriers Not Addressed: Hassle or transaction costs, bounded rationality, access to or understanding of financing, misplaced or split incentives, inseparability of product features, and service or product unavailability
How is the market changing (if at all)? Not available
Other Market Transformation Activities In or Outside of California: The Energy Center of Wisconsin (ECW) *Daylighting Collaborative* aims to increase daylighting as a design element in renovation and new construction of commercial buildings through collaborating with regional and national organizations and utilities.

Services Provided to Market Actors:
Daylighting Productivity Study

	Services Provided to Market Actors								
Market Actor	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Labeling, Standards	Demon-stration	Project Assist-ance	3rd-Party Experts	Other:
Building Owners, Operators	Yes					Yes	Yes		
Designer/Specifier	Yes					Provide			
Contractors									
Retailers									
Distributors									
Manufacturers	Yes								
Lending Agents									
Other:									

C. Indicators of Program Performance

Energy or Value Indicators: Not available
Market Indicators: Not available
Program Activity Indicators: Deliverables include meeting reports, site selection reports, data collection plans, reports, and analysis, and press releases. No information is available regarding current status of the daylighting productivity program.

D. Program Assessment Information

Evaluation of Assumptions: Not available
Support for Market Transformation: Markets will be transformed under this program only if building owners see the results of the study and decide to make daylighting a part of the design of their building. The market effects study will provide some baseline information on attitudes towards daylighting in the market place. A follow up study could be performed in the year following program completion to determine whether the impact of the report has spread.
Conditions for Altering or Withdrawing Program: If the study's results do not show a strong correlation between daylighting and increased productivity, the program should either be withdrawn, or altered to focus more on other benefits of daylighting.

References:

Pacific Gas and Electric Company. *Application of Pacific Gas and Electric Company for Approval of 1998 Energy Efficiency Programs.* San Francisco, CA. October 1997.

Pacific Gas & Electric Company. *1998 Customer Energy Efficiency Programs, Advice Filing 2086-G/1776-E, Attachments.* San Francisco, CA. June 1998.

Pacific Gas & Electric Company. *PG&E Second Quarter Status Report.* San Francisco, CA. July 1998.

Pacific Gas and Electric Company. *PG&E's Third Party Proposal Program Specific Conditions: Daylighting Productivity Study*. San Francisco, CA. 1998.

Energy Center of Wisconsin. *Daylighting Collaborative*. URL:http://www.ecw.org. 1998.

Microelectronics Industry Efficiency Initiative

A. Program Description and Objectives

Program Administrator Area: Nonresidential
Program Budget: NEEA Program Budget $1.43 million over three years (Out-of-State Programs)
Program Reporting Category: Not applicable
Program Commitment: Multi-year
Program Description and Market Transformation Plan: The Microelectronics Industry Efficiency Initiative (MIEI) is a multi-year program sponsored by the Northwest Energy Efficiency Alliance (NEEA). The Northwest microelectronics industry is a vast and growing enterprise, producing silicon crystals, semiconductor chips, circuit boards and other components that wind up in electronic equipment such as computers. It is the region's largest employer, and it consumes large amounts of electricity. This Alliance venture aims to greatly expand Design for Energy Efficiency (DFEE) in the booming and energy-intensive Northwest microelectronics industry. The MIEI will work with "early-adopter" companies who have strong competitive interests to substantially improve design for energy and resource efficiency and capture substantial business advantages.

Design for energy efficiency saves a lot of electricity. Yet its most important contribution to companies is it produces significant non-energy business benefits and competitive advantage. Some of the non-energy benefits of design for energy efficiency include: (1) reduced fab (semiconductor factory) capital cost; (2) reduced fab construction time and process tool qualification time, which reduces time to market, a crucially important metric for chip manufacturers; (3) improved reliability, maintainability, yield, productivity, and factory environment; (4) reduced silicon wafer scrap rate; (5) reduced risk and risk management expenditures; (6) improved employee safety, morale, enthusiasm and retention; (7) improved corporate green leadership image, perhaps affecting market share; (8) reduced exposure to post Kyoto Protocol regulatory effects, and creates a new profit center associated with carbon dioxide (and other greenhouse gas) trading credits relative to other industry competitors; (9) accelerated tool vendor cash flow; (10) reduced operating and maintenance costs (electricity is often the largest single operating cost).

The greatest business benefits for a company result from implementing whole-systems-oriented, DFEE process technology. A typical DFEE process involves a semiconductor manufacturer and its engineering services and equipment suppliers with a team of energy efficiency experts. The process involves an intensive short-term design and technology review and results in detailed recommendations. Primary objectives are to maximize system integration, project economics, and strategic competitive benefits. Examples of potential technical improvements include: (1) Whole-factory-system design integration; (2) Energy efficiency performance metrics, measurement and data visualization technology; (3) High efficiency HVAC design; (4) Combined heat and premium power applications using fuel cells; (5) Improved exhaust control; (6) Improved energy efficiency in tool systems; and (7) Light guides for fabrication lighting.

The market transformation plan is to expand Design for Energy Efficiency (DFEE) to reach the entire Northwest microelectronics industry. The MIEI will work with "early-adopter" companies to demonstrate improved design for energy and resource efficiency and capture

substantial business advantages. The demonstration sites will then be used to expand the service in order to make DFEE a self-sustaining integral business element within the Northwest microelectronics industry.
Program Implementers and Affiliates: Consultants, vendors, manufacturers, industry consortium
Customer/Building Type: Customers: commercial and industrial (> 200 kW demand); Building Type: manufacturing, office
Energy End Uses: Space cooling, heating, ventilation, lighting, drive power (motors), process, other
End-Use Technologies, Services, Practices: High efficiency HVAC design, combined heat and premium power applications using fuel cells, improved exhaust control, improved energy efficiency in tool systems, and light guides for fabrication lighting, high-efficiency motors and variable-speed drives
Customer Geographic Area: Pacific Northwest (Washington, Idaho, Oregon, Western Montana)

B. Market Transformation Characteristics

Market Event: Facility retrofit, facility renovation, equipment purchase
Market Barriers Addressed: Information/search costs, hassle/transaction costs, asymmetric information/opportunism, performance uncertainty, organizational practices or custom, service or product unavailability
Market Barriers Not Addressed: Bounded rationality, access to or understanding of financing, misplaced or split incentives, inseparability of product features
How is the market changing (if at all)? Not available
Other Market Transformation Activities In or Outside California: The Energy Center of Wisconsin (ECW) and the *Wisconsin Manufacturers Extension Partnership* (WMEP) are initiating a pilot project that will test the effectiveness of a partnership between ECW and WMEP. WMEP provides manufacturing modernization services to small- to medium-sized Wisconsin industries with a goal to improve the industries' profitability and competitiveness. The main objectives of the pilot are to: 1) demonstrate whether WMEP modernization and process improvement activities result in energy efficiency; 2) demonstrate whether an increased understanding among WMEP field agents of industrial energy efficiency opportunities and resources can increase profitability and process efficiency; 3) determine if coordinating resources among WMEP, WI utilities, and WI energy-efficiency organizations effectively supports the objectives of WMEP, energy organizations, and the PSC. A full evaluation of the pilot is not budgeted, rather case studies will be conducted for a small sample of industries served.

Services Provided to Market Actors:
Microelectronics Industry Efficiency Initiative

	Services Provided to Market Actors								
Market Actor	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Labeling, Standards	Demon-stration	Project Assist-ance	3rd-Party Experts	Other: Design Services
Building Owners, Operators	Yes					Yes	Yes	Yes	
Designer/Specifier	Yes	Yes				Yes	Yes		
Contractors									
Retailers									
Distributors									
Manufacturers	Yes (Audits & Surveys)			Yes					Yes
Lending Agents									
Other:									

C. Indicators of Program Performance

Energy or Value Indicators: Not available
Market Indicators: Tracking the number of industries who respond to the program and the number of industries that participate and follow through with energy efficiency projects will be one market indicator of program success.
Program Activity Indicators: Not available, but might consist of the number of companies contacted or projects initiated and completed.

D. Program Assessment Information

Evaluation of Assumptions: The underlying assumption of this program is that key decision-makers in the microelectronics industry are not aware of the multiplicity of benefits associated with DFEE. This assumption could easily be tested via a telephone or written survey of a sample of such decision-makers.
Support for Market Transformation: The short-run performance of MIEI's DFEE activities could be assessed through the use of a program tracking system. A tracking system would enable program administrators to determine the number of industries who participate in various activities provided by the program. The long-run success of the program could be measured based on the demand for energy/resource/productivity efficiency services on a self-sustaining basis.
Conditions for Altering or Withdrawing Program: Conditions for altering or withdrawing the program will depend upon successful demonstrations of Design for Energy Efficiency in the microelectronics industry and marketing DFEE to the general microelectronics industry.

References:

Northwest Energy Efficiency Alliance. *Microelectronics Industry Efficiency Initiative.* URL:http://www.nwalliance.org. 1998.

Energy Center of Wisconsin. *Wisconsin Manufacturers Extension Program Partnership Pilot Program.* URL:http://www.ecw.org. 1998.

Silicon Crystal Growing Facilities Program

A. Program Description and Objectives

Program Administrator Area: Nonresidential
Program Budget: NEEA Budget $1 million over three years with matching funds from Siemens Solar (Out-of-State Programs)
Program Reporting Category: Not applicable.
Program Commitment: Multi-year
Program Description and Market Transformation Plan: The Silicon Crystal Growing Facilities Program is a multi-year program sponsored by the Northwest Energy Efficiency Alliance. Silicon for photovoltaic and semiconductor applications is melted in super-heated furnaces and shaped into cylindrical tubes called ingots. Roughly half of all U.S. silicon crystal and wafer production is located in the Pacific Northwest. This project promises significant efficiencies in an energy-intensive industrial process forecasted to substantially expand around the region. It will focus on improving the efficiency of the "crystal-growing" furnaces, which currently have an average power demand of 250 kilowatts of direct-current electricity. These efficiencies are projected to cut production costs by 4% percent for photovoltaic cells built with commonplace single-crystal silicon.

The contractor-Siemens Solar Industries, the world's largest producer of single-crystal silicon solar cells-has done preliminary testing on furnace changes but will refine the design and assure crystal quality under the project funded by the Alliance board in October 1997. Siemens estimates that their improvements could eventually yield energy savings of 40 to 50 percent. Non-energy benefits include significant reductions in argon and a cut in processing time by as much as 15 percent. All told, these benefits will likely reduce the overall solar photovoltaic cell price and improve their attractiveness as an alternative power source. This project will develop and implement furnace efficiencies at Siemens' facility in Vancouver, Wash., which produces silicon ingots that are later sliced into photovoltaic cells.

The market transformation plan is to transfer the energy saving technologies developed in the Silicon Crystal Growing Facilities Program to the much larger semiconductor industry, which uses the same furnaces to produce ingots for microelectronics applications.
Program Implementers and Affiliates: Consultants, vendors, manufacturers, industry consortium
Customer/Building Type: Customers: commercial and industrial (> 200 kW demand); Building Type: manufacturing, office
Energy End Uses: Process, other
End-Use Technologies, Services, Practices: High efficiency "crystal-growing" furnaces
Customer Geographic Area: Pacific Northwest

B. Market Transformation Characteristics

Market Event: Facility retrofit, facility renovation, equipment purchase
Market Barriers Addressed: Information/search costs, hassle/transaction costs, asymmetric information/opportunism, performance uncertainty, organizational practices or custom, service or product unavailability
Market Barriers Not Addressed: Bounded rationality, access to or understanding of financing, misplaced or split incentives, inseparability of product features

How is the market changing (if at all)? Not available

Other Market Transformation Activities In or Outside California: The Energy Center of Wisconsin (ECW) and the *Wisconsin Manufacturers Extension Partnership* (WMEP) are initiating a pilot project that will test the effectiveness of a partnership between ECW and WMEP. WMEP provides manufacturing modernization services to small- to medium-sized Wisconsin industries with a goal to improve the industries' profitability and competitiveness. The main objectives of the pilot are to: 1) demonstrate whether WMEP modernization and process improvement activities result in energy efficiency; 2) demonstrate whether an increased understanding among WMEP field agents of industrial energy efficiency opportunities and resources can increase profitability and process efficiency; 3) determine if coordinating resources among WMEP, WI utilities, and WI energy-efficiency organizations effectively supports the objectives of WMEP, energy organizations, and the PSC. A full evaluation of the pilot is not budgeted, rather case studies will be conducted for a small sample of industries served.

Services Provided to Market Actors:

Silicon Crystal Growing Facilities Program

	Services Provided to Market Actors								
Market Actor	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Labeling, Standards	Demon-stration	Project Assist-ance	3rd-Party Experts	Other:
Building Owners, Operators									
Designer/Specifier						Yes	Yes		
Contractors									
Retailers									
Distributors									
Manufacturers		Yes				Yes	Yes		
Lending Agents									
Other: Siemens				Yes		Provide			

C. Indicators of Program Performance

Energy or Value Indicators: Not available.

Market Indicators: Tracking how the Silicon Crystal Growing Facilities Program influences the industry for high efficiency "crystal-growing" furnaces.

Program Activity Indicators: Not available.

D. Program Assessment Information

Evaluation of Assumptions: A key underlying assumption of this program is that significant efficiency improvements in “crystal growing” furnace technology will be readily adopted by the remainder of the silicon wafer industry once they are developed and demonstrated by an important company. This assumption could be tested by a review of how past innovations in the industry have been adopted.

Support for Market Transformation: The short-run success of the program will be demonstrating the high efficiency "crystal-growing" furnace. The long-term success of the program can be assessed by seeing if high efficiency "crystal-growing" furnaces become the industry standard.

Conditions for Altering or Withdrawing Program: Conditions for altering or withdrawing the program will depend upon successful demonstration of the high efficiency "crystal-growing" furnace and the degree to which the technology becomes the industry standard.

References:

Northwest Energy Efficiency Alliance. *Microelectronics Industry Efficiency Initiative.* URL:http://www.nwalliance.org. 1998.

Energy Center of Wisconsin. *Wisconsin Manufacturers Extension Program Partnership Pilot Program*. URL:http://www.ecw.org. 1998.

Vendor Linkages to Customers Program

A. Program Description and Objectives

Program Administrator Area: Non-residential
Program Budget/Percent of Total: PY98 California PGC DSM Budget $1.0[19] million (New PY98 Utility Program)
Program Reporting Category: Nonresidential information
Program Commitment: Multi-year
Program Description and Market Transformation Plan: Both commercial and residential customers often have difficulty locating suppliers of energy efficient equipment and ask utilities for referrals. Vendors want "hot" leads from utility staff, but staff are not allowed to recommend specific vendors. The Vendor Linkages to Customers Program is meant to help connect customers with suppliers without providing specific recommendations for one supplier over another. The program provides vendor referrals through a searchable database accessed via the Internet or mail and fax service to customers that do not have internet access. In addition, customers are provided with extensive information to help them make informed purchasing decisions. The Website includes equipment guides, technical articles, calculation tools, equipment databases, and guidelines for choosing a contractor. Certain products that are particularly hard to find (such as new fluorescent torchiere light fixtures) are given added prominence.

The market transformation plan is to raise customer awareness of energy efficiency through widespread advertising and then help the customer through the entire purchasing process. Vendor fees for listing on the Website expand the marketing budget beyond PGC funds and allow for widespread advertising. As more vendors sign up the program will become self-sustaining.
Program Implementers: Consultants, utility staff
Customer/Building Type: All commercial building types and residential customers
Energy End Uses: All
End Use Technologies, Services, Practices: All
Customer Geographic Area: Central and Northern California

B. Market Transformation Characteristics

Market Event: Equipment purchase
Market Barriers Addressed: Information or search costs, hassle or transaction costs, asymmetric information or opportunism, and service or product unavailability
Market Barriers Not Addressed: Organizational practices or customs, performance uncertainties, bounded rationality, access to or understanding of financing, misplaced or split incentives, inseparability of product features
How is the market changing (if at all)? Not available
Other Market Transformation Activities In or Outside of California: None identified

[19] Program budget does not include the SoCal Gas Partners in Business Program.

Services Provided to Market Actors:
Vendor Linkages to Customers Program

	Services Provided to Market Actors								
Market Actor	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Labeling, Standards	Demon-stration	Project Assist-ance	3rd-Party Experts	Other:
Building Owners, Operators	Yes		Yes						
Designer/Specifier	Yes		Yes						
Contractors	Yes		Yes						
Retailers	Yes	Yes	Yes						
Distributors	Yes		Yes						
Manufacturers	Yes		Yes						
Lending Agents									
Other:									

C. Indicators of Program Performance

Energy or Value Indicators: No cost effectiveness information is provided. According to PG&E, cost effectiveness is strongly indicated based on the following information: use of low-cost Websites to link customers with vendors; vendors paying to be listed on the site; program coverage of all commercial and residential market segments; and most of the technologies promoted through the Website being cost effective by themselves (i.e., Energy Star lighting fixtures and appliances).

Market Indicators: The PG&E SmarterEnergy Website has been publicly available for only a short time so it is too early to discern any market effects. The program manager reports that as of early August 40 vendors had signed up (i.e., paid) to be listed on the site. Vendors' willingness to pay a fee to be included in the site database indicates that the site could eventually become self-sustaining.

According to information provided by Ecos Consulting (Ecos 1998), in response to the ENERGY STAR programs, General Electric recently began production of its new 67-watt 2-D fluorescent lamp - a single fluorescent light source brighter than a 300-watt halogen bulb, specifically tailored to the technical specifications of PG&E's 3rd-Party Energy Star Torchiere Program. GE has also proceeded to enter into business arrangements with several fixture manufactures that will produce and distribute new ENERGY STAR® qualified torchiere light fixtures, co-branded with General Electric. Furthermore, GE and its new partners have succeeded in encouraging several national-retailing chains to stock these new products. The culmination of this work is that, in late 1998 a variety of new high-efficiency and high-quality torchiere light fixtures will be available in several major California retail outlets, staking their claim to replace the dangerous and inefficient halogen fixtures.

Program Activity Indicators: Pre-production development of Website, including gathering vendor contact data, updating vendor information database and conducting focus groups are completed. First direct mail vendor solicitation was in February 1998. Site launched ahead of schedule in early March 1998. Site re-tooled in April, May, and June 1998 to include more information to help customers make energy-efficient purchasing decisions. During the month of June, PG&E greatly increased the amount of energy-efficient equipment purchasing information available on the Website and began the first round of vendor sign-ups. According to PG&E, over 40 vendors have signed up to participate on the Website as of August 1998.

D. Program Assessment Information

Evaluation of Assumptions: The number of vendors signing up to advertise on the Website will provide an indication of the success (see above). Other indicators will include the number of "hits" on the Website. Electronic customer surveys could also be used to solicit feedback from customers.

Support for Market Transformation: Support for market transformation can be assessed by tracking increased sales of energy efficient equipment by participating vendors, vendors signing up because competitors have done so, changes in vendor stocking practices, and number of customers who use this service as opposed to a source such as the Yellow Pages to find vendors. Surveys of participating vendors will be relatively easy, since they are already enrolled in the program. Surveys of customers will be more difficult, as pinpointing a target group to survey may not be possible. However, on-line questionnaires and tracking of customer "hits" to various areas of the site can be used to assess which sections are of value to customers.

Conditions for Altering or Withdrawing Program: If vendor participation is low after extensive marketing, the program should be re-evaluated. Site traffic will also be a good indicator of whether the program needs to be re-evaluated. PGC funding could be reduced and eventually withdrawn as the program becomes financially self-sustaining through vendor listing fees.

References:

Ecos Consulting**.** *Market Transformation Programs and the 1999 Transition Phase. August, 1998.*

Pacific Gas & Electric Company. *Application of Pacific Gas and Electric Company for Approval of 1998 Energy Efficiency Program, Shareholder Incentive Mechanism for 1998 Programs, a Cost Accounting Process for Transfer of Surcharge Funds, and Update of Energy Efficiency Commitments.* San Francisco, CA. October, 1997.

Pacific Gas & Electric Company. *1998 Customer Energy Efficiency Programs, Advice Filing 2086-G/1776-E, Attachments.* San Francisco, CA. June 1998.

Pacific Gas & Electric Company. *PG&E Second Quarter Status Report.* San Francisco, CA. July 1998.

Pacific Gas and Electric Company. *PG&E's Third Party Proposal Program Specific Conditions - Energy Star Torchiere Program.* San Francisco, CA. 1998.

Energy Efficiency and Property Valuation Study

A. Program Description and Objectives

Program Administrator Area: Nonresidential Retrofit
Program Budget: PY98 California PGC DSM Budget $143,000 (3rd-Party Program)
Program Reporting Category: Nonresidential Other
Program Commitment: Single year
Program Description and Market Transformation Plan: The Energy Efficiency and Property Valuation Study will develop linkages between energy efficiency and property valuation in commercial buildings. Stakeholders shall include appraisers, building owners, building managers, energy service companies, utilities, regulators, and real-estate investors (including representatives of banks, real-estate investment trusts, pension funds, insurance companies, etc.). Stakeholders will be identified based on two criteria: (1) capacity to influence large portions of the market, and (2) the extent to which their viewpoints might be considered typical of their profession. Project goals are to identify 100 to 300 certified general appraisers, at least ten building owners, five building managers, at least five sizable real-estate investors, and ten energy service company representatives as potential program participants.

The Program will conduct a market survey assessment of current attitudes and practices regarding valuation of energy efficiency in commercial buildings. Data to be gathered through the market survey will include: (1) how much commercial building appraisers know about energy efficiency; (2) to what extent energy efficiency is considered in property value appraisals for commercial buildings; (3) what methods are used in considering energy efficiency in commercial building appraisals; (4) what barriers might impede greater consideration of energy efficiency in commercial building appraisals; and (5) what strategies might be employed to lower these barriers. The program will conduct a sensitivity analysis to model how changes in energy prices or other factors might affect value of energy efficiency investments. In addition, the program will provide model policies aimed at the municipal or state level to protect buildings with incremental appraised energy-efficiency value from additional property tax assessment.

The market transformation plan aims to raise awareness regarding the importance of including energy efficiency within property valuation in the short term. In the long term, the program aims to influence the real estate community to adopt a methodology for including energy efficiency when setting property values. In addition, the program will provide model policies aimed at the municipal or state level to protect buildings with incremental appraised energy-efficiency value from additional property tax assessment.
Program Implementers and Affiliates: Utility staff, consultants
Customer/Building Type: Commercial customers and all types of commercial buildings
Energy End Uses: All
End-Use Technologies, Services, Practices: All
Customer Geographic Area: Northern California

B. Market Transformation Characteristics

Market Event(s): Real estate sales and transactions for both new and exiting construction
Market Barriers Addressed: Organizational practices or customs, information or search costs, hassle or transaction costs, access to or understanding of financing, misplaced or split incentives

Market Barriers Not Addressed: Performance uncertainties, asymmetric information or opportunism, bounded rationality, inseparability of product features, and service or product unavailability
How is the market changing (if at all)? Not available
Other Market Transformation Activities In or Outside California: None identified.
Services Provided to Market Actors:
Energy Efficiency and Property Valuation Study

	Services Provided to Market Actors								
Market Actor	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Labeling, Standards	Demon-stration	Project Assist-ance	3rd-Party Experts	Other: Study, Policies
Building Owners, Operators	Yes								Survey study
Designer/Specifier									
Contractors									
Retailers									
Distributors									
Manufacturers									
Lending Agents	Yes								Survey study
Others: Appraisers, Realtors, Investors,	Yes								Survey study
Others: Gov't. Legislators	Yes								Policy Guidelines

C. Indicators of Program Performance

Energy or Value Indicators: Not available
Market Indicators: Not available
Program Activity Indicators: Not available

D. Program Assessment Information

Evaluation of Assumptions: The third party proposal indicates that the commercial real estate market does not value energy efficiency in valuation, but no evidence is provided to support this assumption. Program objectives include developing sets of guidelines and policies for including energy efficiency in commercial property valuation. Short-term success should be based on the outcome of the market survey and analysis. Long-term success could be determined using surveys of to determine whether or not the private sector has adopted the recommendations made in the study. One could also monitor regulatory and policy guidelines to determine if they are modified in order to address the identified market barriers.
Support for Market Transformation: Not available
Conditions for Altering or Withdrawing Program: Conditions for altering or withdrawing the program will depend on whether or not the private sector adopts recommendations made in the study and whether or not regulatory or policy guidelines are adopted to address the identified market barriers.

References:

Pacific Gas and Electric Company. Third Party Proposal Program. *Project on Energy Efficiency and Property Valuation.* San Francisco, CA. 1998.

Local Government and Community Energy Efficiency Program

A. Program[20] Description and Objectives

Program Administrator Area: Nonresidential Retrofit
Program Budget: PY98 California PGC DSM Budget $460,000 (3rd-Party and Out-of-State Programs)
Program Reporting Category: Nonresidential Other
Program Commitment: multi-year
Program Description and Market Transformation Plan: The Local Government and Community Energy Efficiency (LGCEE) Program recruits local government participation through supporting startup of a Community Energy Authority (CEA). The program provides the following services: 1) local government support for retrofitting single-family and multi-family homes, and small to medium-sized businesses 2) assistance in performing energy efficiency analysis, design, and implementation services; 3) assistance in performing audits in local government facilities by providing energy design and accounting software training, and facilitating; and, 4) 3rd-party financing of energy-efficient building retrofits.

The market transformation plan is that once customers have gained enough positive experience with the program, they will expect and demand such services on a continuing basis from other product vendors and service providers. It is also expected that educated local governments will incorporate energy efficiency into planning and be responsive to community concerns in this area. Finally, the program will work with elected officials at the local level to implement local energy policies that institutionalize efficient energy use practices. Links to the Department of Energy Rebuild America Program will help share the lessons learned and educate additional communities. In addition, this program will adopt some of the approaches from the Developing Green Communities Program (New Construction Administrator). For example, narrowing of streets and tree planting along streets and in parking lots will reduce urban heat islands, thereby lowering cooling loads. Such strategies also make communities more livable and pedestrian friendly, which will aid implementation in some cities.

This program attempts to transform the market by providing information from unbiased community or local government sources. This is expected to lead to increased implementation of energy efficiency retrofits. In addition, by aggregating demand for energy services, prices should be reduced, also leading to greater participation. Successful applications of technologies are publicized, and program strategies are shared between communities. The program targets a mix of customers in order to support local programs that reflect the needs and resources of specific communities. Other related programs, such as aggregated purchase of renewable energy, might be considered in the future.

The aim is to develop and link community resources (e.g., local banks and credit unions, contractors, small business organizations, service clubs, local governments, and non-profits) in a program that will become self-sustaining. Links with State and Federal resources (e.g., the Rebuild America program, state Residential Quality Assurance efforts) provide technical expertise as well as models of similar programs that have been implemented in other states. As community resources are developed, such as local bank financing and increased expertise among contractors,

[20] Note that for 1998 programs, "program" is the *combination* of similar utility-sponsored programs.

the market is transformed resulting in higher levels of penetration of energy efficiency products and services in residential and small commercial markets.

Initially, funding is needed for program administration as partnerships and resources are developed, and the program is marketed through community groups. As volume of retrofits grows, fees for service provide revenue for program administration. A Rebuild America program in Webster City, Iowa, used this model and took a percentage of each project's cost to cover administrative costs of the program. Thus the mature program could be self-sustaining, once the market has been sufficiently transformed.

In addition, other funding from local governments, block grants, or other programs may provide temporary support the program in some communities. Such programs may include Energy Education Trust and LIEP. Development of local resources also creates profit opportunities so that some aspects of program are taken over by private market actors. The market is transformed as local expertise is developed, a threshold of awareness is reached, and costs are lowered through aggregate purchasing.

Program Implementers and Affiliates: Local governments, community-based non-profits, business groups, banks/credit unions, service clubs, consultants, contractors and vendors; Affiliate: Rebuild America

Customer/Building Type: Customers: homeowners, small businesses, non-profit organizations, local governments, and owners of multi-family housing; Building Type: Residential and commercial.

Energy End Uses: HVAC, lighting, building envelope, office equipment, water heating, controls

End-Use Technologies, Services, Practices: all, with emphasis on high-efficiency HVAC, reducing urban heat islands, lighting, and refrigerators; Practices: Audits, Links to financing services

Customer Geographic Area: All CEC climate zones

B Market Transformation Characteristics

Market Event: Retrofit and equipment replacement

Market Barriers Addressed: Performance uncertainties, access to financing, hassle/transaction costs, organizational practice or custom, information/search costs, asymmetric information, access to or understanding of financing, service or product unavailability

Market Barriers Not Addressed: misplaced or split incentives, inseparability of product features

How is the market changing? Both residential and small commercial markets are changing more slowly than other markets. Possible changes in revenue cycle, e.g., fixed costs, may change economics of retrofits. Part of the residential market will purchase "green" energy, at a higher cost. However, the small size of projects for small commercial or residential customers makes them unlikely targets for the existing energy services industry. Without PGC funding, development of local resources and aggregation of purchasing power is unlikely.

Other Market Transformation Activities In or Outside California: The NEEA *Local Government Associations* is allied with local government organizations in the four Northwest states to promote market transformation and specific ventures among towns, cities and counties. Current tasks include recruiting water utilities for the WashWise program, marketing the Building Operator Certification program, communicating to local governments on market transformation and energy efficiency issues, and providing energy code support.

Services Provided to Market Actors:
Local Government and Community Energy Assistance Program

	Services Provided to Market Actors								
Market Actor	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Labeling, Standards	Demon-stration	Project Assist-Ance	3rd-Party Experts	Other:
Building Owners, Operators	Yes	Yes					Receive		
Designer/Specifier									
Contractors									
Retailers									
Distributors									
Manufacturers									
Lending Agents									
Other: Local Government	Yes	Yes					Provide		

C. Indicators of Program Performance

Energy or Value Indicators: Dan Lieberman from the City of San Jose provided a benefit-cost ratio of 2.08 based on example calculations for commercial and residential building projects. Limited evidence is provided to support the cost-effectiveness calculation.

Residential Example: Assuming the program reaches 200 residences per year. Total of 2,000 residences with average electric kWh cost of $1,080 per year. Assuming 20% savings yields about $200 per year of energy savings per house. Total savings for residential sector would be $400,000 per year. Commercial Example: Assuming energy costs of $2.00/sf and estimated savings of 20% for 2 million square feet yields total savings of $800,000 per year. Total savings for residential and commercial are $1.2 million per year. Assume a payback of 5 years and an average payback or $5,000,000. Assuming the program cost is $1 million per year, and assuming a 15-year measure life yields a Net Present Benefit (NPV) of approximately $12.5 million. The program cost for this example is $1,000,000, and the estimated customer cost is $5,000,000 with estimated customer benefits of $1,200,000 in annual savings. In addition, estimated additional societal benefits are 92 jobs created.

Market Indicators: Developing local resources (e.g., participation of banks, service clubs, and other groups), growth in number of retrofit contractors, ability of program income to support administration, increased awareness of energy efficiency benefits. Local jurisdictions will include a market assessment and evaluation component in their programs.

Program Activity Indicators: Current activities for 3rd-Party Program include audits, marketing events/presentations, retrofits, development of financing packages. According to Dan Lieberman, City of San Jose, the program activity indicators will vary depending on each community's plan.

D. Program Assessment Information

Evaluation of Assumptions: The critical assumption is that cities and community-based organizations can increase penetration of energy efficient products and services in under-served small commercial and residential markets. This will be tested by the local partnerships' ability to mobilize local resources, and by increasing participation in the program. Additional market research may be needed to establish baseline penetration levels before a program is initiated. through the program.

Support for Market Transformation: The initial progress can be assessed by considering:

number of participating cities, number of projects that are undertaken or the square footage impacted; program cost-effectiveness; changes in government project specification and design practices; and use of successful project results in future projects. No methods for collecting such data are provided, but a market effects study will be done as part of the program.
Conditions for Altering or Withdrawing Program: PCG support could be gradually withdrawn as local government business managers become willing to continue the energy use analysis and energy-efficient system design assistance using private industry resources. However, unless local governments fund consultants or staff to do this type of work, PGC funding will be needed to continue the program and market it to other local governments. Strong successes will be key to recruiting the interest and financial support from additional cities.

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Integrated Small Commercial Energy Efficiency Program

A. Program Description and Objectives

Program Administrator Area: Nonresidential
Program Budget: New Program Concept (CEC suggests $700,000/year or approximately $14,000 per customer based on Commission experience with providing technical assistance to small school districts and local governments.)
Program Reporting Category: Nonresidential Information, Commercial Energy Management Services, Commercial Energy Efficiency Incentives
Program Commitment: Multi-year
Program Description and Market Transformation Plan: The Small Commercial Energy Efficiency Program is designed to help small commercial customers, those with an annual electricity consumption of 1,000,000 kWh or less, identify and implement energy efficiency projects in their facilities.[21] The elements of this program include:

- Cost sharing of the technical assistance with customers. The technical assistance would be provided by program-sponsored consultants, from a list of "qualified" ESCOs or consultants, or consultants of the customer's own choosing. The specific technical assistance includes energy audits to identify cost-effective improvements in facilities, contractor selection assistance, project design assistance, project implementation and post-installation assistance, energy efficiency equipment specification preparation and building and project commissioning.
- Equipment incentives. The incentive would be small and cover about 10-20 percent of the project cost--similar to PG&E's Retrofit Express Program.
- Financing to cover the customer's share of the service and the cost of installing the recommended projects. The financing would either be in the form of low interest loans or private financing for small sized projects, such as less than $200,000.
- Workshops and/or case studies to inform others of the implementation path and process. These informational workshops and case studies are aimed at creating awareness about energy efficiency, the process and to create a "local" mentor who can assist others in implementing energy efficiency projects in their facilities.
- A guidebook on how to do energy efficiency projects. The guidebook will provide small commercial customers with information on how to do energy efficiency project in their facility, including determining project potential, estimating the project costs and economics and identifying resources for implementation and installation. The guidebook could be patterned after the Commission's "How to" handbook series for energy project management. This series has been well received by both the public and private entities.

The market transformation plan is designed to minimize the customer's transaction cost associated with helping a customer identify and implement energy efficiency projects through all delivery paths including: self installation, hiring local contractors and using full service energy

[21] Small commercial customers with monthly electric loads of 20 kW or less or with annual electricity use less than 1,000,000 kWh may not be eligible for the Standard Performance Contract (SPC) Program. A 20% reduction in annual energy use is the typical savings seen in Energy Commission marketing efficiency programs. This equals 200,000 kWh of savings which is the minimum level required for SPC Program eligibility. About 800,000 customers are in electricity rate classes with annual electricity use of 20 kW/month or less (CEC staff estimate based on typical operating budgets for schools, local governments and colleges).

services companies (ESCOs). Minimizing the transaction cost and guiding the customer through the installation phase will result in an 80-90 percent implementation rate of the recommended projects identified in the energy audit.[22] Experience has shown that follow-up assistance beyond the audit is necessary to ensure that the recommended projects are installed in a timely manner. Without the follow-up, implementation could take four or more years, especially in publicly operated facilities. In the long term, it is anticipated that the workshops, case studies, local "mentors" and the guidebook will continue to provide a template for others to follow.

Program Implementers and Affiliates: Consultants would provide the technical assistance. The program manager (or a third party) would operate the program and provide the due diligence review of the deliverables prior to payment of the incentive. ESCOs, or mechanical and lighting contractors would provide the project installation. Vendors, distributors and retailers would supply the energy equipment.
Customer/Building Type: All commercial customers, but focuses primarily on small, commercial customers (such as those with energy efficiency projects that will result in less than 200,000 kWh/year of annual savings).
Energy End Uses: HVAC, lighting, controls, water heating, refrigeration, pumps, motors, fans
End-Use Technologies, Services, Practices: Installation of high efficiency HVAC, lighting, controls, water heating, refrigeration, pumps, motors and/or fans
Customer Geographic Area: All CEC climate zones

B. Market Transformation Characteristics

Market Event(s): Retrofit, renovation, planned replacement, emergency replacement, new construction (in which Title-24 is invoked)
Market Barriers Addressed: This program is designed to address the following barriers:

- lack of customer staff to implement an energy efficiency program--the program provides consultants or the customer can use its own consultant from start to finish. The program will share the consultant cost. The program minimizes the customer's transaction cost associated with identifying, implementing and funding energy efficiency projects.
- lack of customer knowledge or information about energy efficiency and how to identify and implement energy efficiency projects. The program gives customers confidence in implementing energy efficiency projects and minimizes contractor performance uncertainties. Technical experts (e.g., program manager or program consultant) are available, as needed, to do due diligence on consultant work and to provide technical assistance on projects. One of the products of the program will be case studies and workshops. These products will provide information to similar customers on the benefits of energy efficiency and the process of identification and installation. Another product of this program is the development of a guidebook, specifically designed for small customers, that will discuss how to determine project potential, estimate project costs and savings, provide information on resources for project identification and installation, and funding, and provide sample contracts, bid documents and agreements. The information generated in this program will help institutionalize energy efficiency practices for small customers by providing credible information on successful project implementation and a guidebook which helps customers to

[22] Commission staff estimate from the Bright Schools and Energy Partnership Programs.

understand energy efficiency, the installation process and the economics and the resources for completing the project.

- lack of funding to install the recommended projects. Funding will be available from state financing programs as well as private sources at competitive rates. The desire is a simple application process. Identification of funding sources for small sized projects, including public, non-private and private commercial facilities, will be contained in the guidebook discussed previously.

Market Barriers Not Addressed: The program will not address organizational practices or customs. Depending on the type of commercial customers, energy costs are typically less than 5 percent of the total operating budget. Since energy makes up a small portion, energy efficiency may not be viewed as a priority project, compared to others. Successful implementation of an energy efficiency program depends on an organizational champion who can convince management of the benefits of energy efficiency. Though this program will provide a customer with all the tools necessary to be a champion, it still requires that the customer have the initiative and desire to want to do the project and to convince others of the benefits. Without a champion the process will be delayed and the projects likely will not be installed.

How is the Market Changing If at All? There is uncertainty on future electricity cost. Will transmission and distribution costs be fixed and based on the cost to provide services and indifferent to the amount of electricity consumed? or will it remain unchanged from the current structure, such as charged on a $/kWh basis and be the same for all customers? This uncertainty could affect the cost-effectiveness of the types of energy efficiency projects, services or practices to be recommended and installed by the customer. If there were no PGC-funded program, customers, especially the small commercial, probably would do little or no energy efficiency installation. Installation of energy efficiency will only be done as a result of equipment replacement or governmental regulation. There would be no process or plan, just implementation on an "as needed" basis.

Other Marketing Activities in (or Outside) California:

California Energy Commission: Local Government and Schools Program (Energy Partnership and Bright Schools Programs)--provides technical assistance to identify and implement projects and funding to implement projects. Assistance provided to all local governments and schools

California Department of General Services (Energy Assessments): Revenue Bond Program-provides technical and financial assistance to identify and finance energy efficiency projects-primarily focuses on large customers

Various 1998 Utility Programs (uncertain whether these will be continued in the future):

SCE-- Small business energy use survey and lighting modification program, energy efficiency incentive program, local government energy efficiency awareness program, LED exit sign program; SDG&E--small commercial audit and rebate program

Services Provided to Market Actors:
Integrated Small Commercial Energy Efficiency Program

	Services Provided to Market Actors								
Market Actor	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Labeling, Standards	Demon-stration	Project Assist-ance	3rd-Party Experts	Other:
Building Owners, Operators	Yes (Info. & Audits)	Yes	Yes	Financing, Incentives			Yes		
Designer/Specifier							Provide (subsidized)		
Contractors									
Retailers									
Distributors									
Manufacturers									
Lending Agents									
Local Government	Yes								
Others-ESCOs							Provide (subsidized)		

C. Indicators of Program Performance

Energy or Value Indicators: Small commercial customers with monthly electric loads of 20 kW or less are estimated to use about 15 million MWh annually compared to 101 million MWh for all commercial and industrial customers.[23] If all the commercial customers with a 20 kW or less load were to implement energy efficiency projects as a result of this program, we estimate that this would reduce annual energy use by about 10-20 percent or the equivalent of 1.5 million MWh annually.[24] Since projects associated with small commercial customers will typically be lighting, with some HVAC and controls, it is estimated that the savings will occur mostly on the electricity side and the demand reduction is estimated at 4,000 MW.[25]

The most critical criteria effecting cost effectiveness of this program is management and the quality of people in the field selling the program. Critical program management parameters to maintain program cost effectiveness in this market include:

1. Before commitment of audit incentive funds, insure customer readiness by lining up full management support and an acceptable financing mechanism. (Financing through commercial lenders, other parties, or customer funds needs to be identified prior to moving forward).

2. Require a cost share from the customer. Consumer buy-in is an essential ingredient to attain high implementation rates. (PGC incentive should not exceed 50% of the audit costs. The cost share could be mitigated for the customer through a variety of means including potential monitory incentives in the "Small Commercial "Downstream" Incentives program.

3. Insure there is sufficient savings potential to justify investment prior to commitment of

[23] Commission staff estimate based on the 1996 Annual Report of PG&E and SCE and the 1993 Annual Report of SDG&E, analyzed and compiled by Mark Ciminelli.
[24] Commission staff estimate based on annual energy use reductions identified in energy audits for schools and local governments in the Bright Schools and Energy Partnership Programs.
[25] Assumes 4,000 annual operating hours.

resources. (Screening criteria -- Suggest minimum annual energy bill for single meter of $30,000 or $40,000 for two meters or $50,000 for three meters. Some customers might spend $100,000 or more annually. (Approximate lower limit of non residential SPC).

4. Maintain good customer relations through responsiveness. Maintain customer contact throughout the process to ensure any questions are answered and implementation problems are quickly addressed. (Average of 3 telephone and 2 site visits in addition to audit per project.) Provide ongoing customer technical support in assuring quality work by contractors to allow timely and efficient correction of any problems.

If the above parameters are adhered to, it is estimated the Integrated Small Commercial Energy Efficiency Program will produce $750,000 annual cost savings directly attributable to the program. Assuming a 15-year measure life and a 5% discount rate (after financing cost recovery), the NPV of these participant savings is estimated at $7,423,980. TRC results were not provided for this new program concept. However, the participant test, which is more appropriate for this program, indicates a BCR_P of approximately 1.5.

$$\frac{\text{NPV Benefits to participants} = \$7{,}432{,}980}{\text{First Costs to participants} = \$4{,}975{,}000[26]} = 1.5$$

Additional societal benefits are estimated to be pollution prevention worth $38,335 and the creation of 103 jobs in the first year. Please refer to CEC August, 1998 for a detailed listing of assumptions and calculations used to derive all of the energy and value indicators reported in this section.

Market Indicators: Specific market changes include increased customer interest and understanding and knowledge of energy efficiency. These result in successfully addressing the market barriers identified in Section B. With the due diligence review by the program manager or others, consultants and contractors providing services to the program will improve the quality of their technical reports. This results in customers having a high level of confidence that the recommended projects will result in the energy savings identified in the energy audit. Increased implementation of energy efficiency will increase product sales for manufacturers, distributors and vendors. This could result in lower equipment cost and improved energy efficiency project economics.

Program Activity Indicators: Specific indicators include increased customer (building owner, operator) interest in participating in the program as a result of the workshops, case studies and other informational items prepared from the program. Increased interest could result in over subscription to the program as demand for services and assistance exceeds available funds. Increased program participants will positively affect the business of the following market actors: designers/specifiers, contractors, retailers, distributors, and lending agents.

[26] Note: Customer finances approximately 50% of technical services cost and 100% of project capital cost. Fifty participants therefore would spend $4,875,000 on goods and services. Average customer will spend approximately $90,000 in up-front capital + $7,500 for audit. (Customer financing, from non PGC sources, can be arranged so savings cover all costs including principal and interest, therefore the actual participant net cost is zero or a negative value).

D. Program Assessment Information

Evaluation of Assumptions: Some of the assumptions used in this program have been tested through the Energy Commission's Energy Partnership and Bright Schools Programs. These assumptions include the need to provide a low cost method of providing technical assistance, energy audits and follow-up assistance. The technical assistance is the hook that gets customers interested in energy efficiency. The follow-up assistance ensures timely installation of the recommendations. The following describes how each assumption can be tested during program operation:

Assumptions	Test
Provision of low cost technical assistance, follow-on installation assistance and equipment rebates will encourage small commercial customers to participate in an energy efficiency program.	• High subscription levels for the program • Attitude surveys determine that the reason for participation is the technical and follow-on assistance and equipment rebates provided by the program
Providing customers with information about energy efficiency through case studies, workshops and the guidebook will improve acceptance, show how to implement projects and reduce the perceived risks of energy efficiency project installation.	• Energy efficiency project demonstrations verify project savings, benefits and economics • Surveys show that case studies and workshops were effective in communicating performance results and benefits to customers • Surveys of both participants and non-participants show that those that read and understood the guidebook and the case studies were more knowledgeable about energy efficiency and more apt to implement projects in their facilities, either through the program or on their own. • Survey participants attending workshops or receiving case studies. Determine based on survey or actual applications, how many "new" participants result, either with program assistance or independently. If participants are evaluating projects on their own--consider this as market transformation.
Providing a mechanism that would provide low-interest rate and low transaction cost funding will improve energy efficiency project installations.	• Determine how many participants use the "new" financing that is available. If few use it, determine why. High cost? timeliness? risk? other sources cheaper?

Support for Market Transformation: In the short term, the provision of technical and follow-on assistance to small commercial customers, will yield program data, such as customer attitudes toward energy efficiency, typical energy efficiency projects, identified project benefits and savings and the major barriers toward implementation. This data will help the program manager to identify weak links in the process and program improvements needed to overcome implementation barriers. The project data results can be used by the program manager to: 1) develop case studies, 2) be the basis of workshop discussions with similar commercial customers, and 3) serve as the basis for the guidebook which contains real-life energy efficiency project implementation experiences. The guidebook could include a "Master Services List" of energy auditors that meet certain minimal standards to help small customers identify qualified engineering and technical firms. All these items will provide credible information to small commercial customers and other market actors and will increase their knowledge of each other as well as on energy efficiency. In the long term, we hope to see increased customer interest in energy efficiency as a result of the activities of the program. Once customers have gone through the process and understand energy efficiency, they will gain the experience and confidence to do projects on there own or with the

help of consultants and other tools developed through this program. The participants can also assist others in the future and help minimize the information barriers associated with implementation. The short term results could be made available annually based on participant rates, case studies and the workshops. The long term results may not be available for several years, especially if a simple mechanism for selection and identification of qualified energy consultants is not available. The factors that might confound support for market transformation is the changes in the electric industry due to restructuring. Adverse changes in the rate structure could substantially decrease the public's interest in energy efficiency. Also changes in the economy could result in less interest in energy efficiency in favor of other high priority items.
Conditions for Altering or Withdrawing Program: Criteria for an annual program evaluation should be developed prior to implementation of the program to determine whether goals and objectives have been met. The program should be evaluated annually and modified as necessary based on the results of the evaluation and the input from the market actors.

References:

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California Industrial Solutions (CIS) Program

A. Program Description and Objectives

Program Administrator Area: Nonresidential
Program Budget: New Program Concept (CEC suggests $6 million/year - see Part C)
Program Reporting Category: Industrial Energy Management Services, Industrial Energy Efficiency Incentives.
Program Commitment: Multi-year
Program Description and Market Transformation Plan: The program will provide subsidized technical assistance that will identify energy efficiency opportunities in industrial facilities. The program is intended to foster market transformation by developing a sustained demand for technical assistance using a "system approach" which looks not only at energy but the impacts of productivity, pollution prevention, worker safety and environmental mitigation. The program will provide complete "concept to implementation" assistance. This technical assistance will become part of the service offered by organizations that are already working with customers on other issues. In examining not only the energy aspects but also the implications of productivity, pollution prevention and regulatory compliance, this program design is intended to have more relevance to industry's perceived current issues. In addition to this technical assistance the program will include a limited number of jointly funded demonstration projects used to highlight the benefits of a "system approach" and the wider benefits of energy efficiency. Marketing of the service is planned using trade associations and professional societies, etc. The rationale for this program, its elements, and the eventual market transformation to a full fee paying service are described below.

History: Energy efficiency in California has been on the agenda for utilities for more than two decades. Almost all utilities, both investor-owned and municipally operated, have had some kind of program aimed at industrial manufacturing facilities, recognizing that the potential for improvements is large. These programs have had some success but the penetration levels were relatively small. The need of utilities to be able to track and quantify the results of expenditures on energy efficiency activities often meant that programs were designed similar to the residential or commercial model, using simple rebate mechanisms and reporting requirements anticipating that a component or technology improvement would be an attractive proposition to the industrial market. The design of these programs often involved rebate eligibility for such things as the installation of higher efficiency motors, lighting, or air conditioners. The programs were often designed in such a way that they would also be applicable to the commercial and agricultural sectors and many utilities found themselves referring to the "C&I programs." This lack of industrial focus and the component retrofit mentality with its emphasis on lighting, air conditioning replacements and building envelope was not able to persuade industry in large numbers that energy efficiency has more to offer than just energy savings. Later, utility-designed customized rebate programs did have more applicability to the industrial sector, especially for the "process loads" that were almost inevitably more energy intense than the building structure. However, these customized program designs involved the customer in an application process that was perceived as difficult and with an emphasis on energy savings that was difficult to quantify. Without the link to more pressing issues such as productivity or environmental compliance industry was not convinced the customized programs were worth pursuing.

A new emphasis: Although many industrial processes have similar elements such as the need for compressed air or curing and drying ovens, the scale and importance of each element can be unique to an industrial facility. Hence the need for an individualized system approach which looks not only at energy but the impacts of productivity, pollution prevention, worker safety and environmental mitigation. Based on previous experiences and lessons learned, industrial programs need to focus exclusively on the industrial sector and contain several key elements to make them widely applicable, successful and able to transform the market. These elements should include:

1. A focus on solutions to industry issues (i.e., environmental regulation compliance, flexibility in product manufacturing, reduced manufacturing costs, and improved productivity);
2. A commitment by the industry to share the cost of assessing and implementing energy efficiency measures;
3. A peer review process for program redesign or refinement;
4. A delivery mechanism or infrastructure that is able to reach the industrial sector in the normal course of their business and provide this additional technical assistance (several options and organizations already exist);
5. The use of high visibility demonstration projects;
6. Marketing and education through industry associations or professional societies to disseminate the examples and successes of the program; and
7. Monitoring, evaluation and an exit strategy for the program at a point where it can be self-supporting and be shown to have transformed the industrial energy efficiency market.

Program Implementers & Affiliates: Consultants and or organizations now servicing industry, Utility staff, ESCOs, vendors, distributors, industrialists, government
Customer/Building Type: Industrial (SIC codes 10-15 and 20-39), with emphasis on Manufacturing, Mining, Assembly, Oil and Gas Extraction, Industrial Service Industries (SIC's 1000-1499 and 2000-3999)
Energy End Uses: HVAC, lighting, refrigeration, process systems, drive power (motors, air compressors), and industrial manufacturing activities
Energy End-Use Technologies: Electric technologies: high-efficiency lamps, ballasts, exit signs, occupancy sensors, photocells, time clocks, packaged air conditioners, chillers, cooling towers, VFDs, window film, evaporative coolers, high-efficiency motors**,** variable-speed drives, air compressors, industrial process and manufacturing equipment. Natural gas technologies: high-efficiency furnaces, boilers, thermal fluid heaters, kilns, ovens, regenerative thermal oxidizers, and heat recovery systems.
Customer Geographic Area: all CEC zones

B. Market Transformation Characteristics

Market Events: Acceptance of "systems design" for production which includes: energy impacts and energy use as an indicator of potential business performance and as solutions to industries issues. Opportunities to adopt this will come during planned replacement, retrofit, regulatory compliance, new product development, quality control procedures, etc.
Market Barriers Addressed: Organizational practices or customs, performance uncertainties, information or search costs, hassle or transaction costs, access to or understanding of how energy,

pollution prevention, financing, productivity improvements are inter-connected and inter-related, and service or product unavailability.

Market Barriers Not Addressed: Asymmetric information or opportunism, bounded rationality.

How is the market changing, if at all? Without the proposed program the change in the acceptance of energy efficiency as a means to solve other more important issues will progress at a much slower pace. State and federal programs will have some impact and individual consultants may take up the call.

Other Market Transformation Activities in (or Outside) California: The Energy Center of Wisconsin (ECW) *Manufacturers Extension Partnership Program* provides training and promotional information regarding energy efficiency compressed air systems. The ECW and the *Wisconsin Manufacturers Extension Partnership* (WMEP) are initiating a pilot project that will test the effectiveness of a partnership between ECW and WMEP. WMEP provides manufacturing modernization services to small- to medium-sized Wisconsin industries with a goal to improve the industries' profitability and competitiveness. The main objectives of the pilot are to: 1) demonstrate whether WMEP modernization and process improvement activities result in energy efficiency; 2) demonstrate whether an increased understanding among WMEP field agents of industrial energy efficiency opportunities and resources can increase profitability and process efficiency; 3) determine if coordinating resources among WMEP, WI utilities, and WI energy-efficiency organizations effectively supports the objectives of WMEP, energy organizations, and the PSC. A full evaluation of the pilot is not budgeted; rather, case studies will be conducted for a small sample of industries served. The Northwest Energy Efficiency Alliance (NEEA) *Microelectronics Industry Efficiency Initiative* (MIEI) is a multi-year program. The MIEI venture aims to greatly expand Design for Energy Efficiency (DFEE) in the booming and energy-intensive Northwest microelectronics industry. The MIEI will work with "early-adopter" companies who have strong competitive interests to substantially improve design for energy and resource efficiency and capture substantial business advantages.

Services Provided to Market Actors:
California Industrial Solutions (CIS) Program

Market Actor	Services Provided to Market Actors through CIS program							
	Information Advertising Websites	**Linking Vendors & Customers**	**Financial Help**	**Alliances, Labeling, Standards**	**Demon-stration**	**Project Assistance**	**3rd-Party Experts**	**Other: Compliance Examples**
Industrial process facility Owners/ Operators	Yes		Financing, Incentives		Yes	Yes	Yes	
Designers/ Specifiers						Provide (subsidized)		
Contractors						Provide (subsidized)		
Lending Agents								
Distributors								
Manufac-turers								
Regulators	Provide Websites				Yes	Provide		Provide
Other:								

C. Indicators of Program Performance

Energy or Value Indicators: The industrial sector includes around 50,000 establishments and uses approximately 45,000 GWh per year. Of this amount the larger users (1,200 sites) account for approximately 22,500 GWh. It is commonly believed by most industrial energy efficiency practitioners that 10% reductions in energy use within any industrial location are easily achieved, with 25% often attainable but often requiring some capital investments and engineering know how. With modest market penetration of only one percent of the small to medium size customer market per year (approximately 480 establishments using 225 GWh total per year) 10% of that market can save 22.5 GWh per year. This has a value of $22.5 million dollars per year (at $0.10/kWh). If by penetrating the larger consumers at that same modest rate of one percent (i.e. 12 sites per year) then a further 10 percent reduction of their energy consumption is possible. This equates to an additional 22.5 GWh. And a saving of $11.25 Million (based on $0.05/kWh). While these estimates only measure the value of the energy, consumers will be measuring more important benefits to them. The above estimate indicates that 41 “energy projects” per month are undertaken statewide. The organizations envisioned to provide this type of activity currently have a field staffing level of around 200. It would appear that this goal is within the realm of possibility. Initial estimates of the total cost (excluding client co-payment) to implement these annual activities is of the order of 452 projects at $150 per hr at 80 hours per project giving a $5.42 million/year expenditure. Therefore, each kWh would cost around 12 cents (excluding client co-payment) the anticipated life expectancy of each measure is estimated at 4 years therefore, the simplified cost per kWh is 3 cents. Initially, some costs of early intense monitoring and evaluation should be built into the program these have not been quantified. These could be reduced after year two.

Market Indicators: Indicators of the changing market in the industrial sector would be the

requests for demands for these kind of services, increased implementation rates for the proposals and dissemination of the success of the program in the trade and institution press. All these would indicate a change in awareness and organizational practices of the industrial sector.

Program Activity Indicators: These indicators could be monitored by the provider and reported to the CBEE and the Peer Review Panel. Initially they would include the results on a monthly basis of planned activities, implementation of projects and a marketing plan for the additional services offered.

D. Program Assessment Information

Evaluation of Assumptions: The program assumptions should be tested in a number of ways

1. Closer financial estimates of program implementation costs should be obtained.
2. A survey of the industrial sector should be conducted via trade associations to ascertain the desire to participate in the program
3. A pilot of 20 technical assistance projects should be implemented to estimate effectiveness and client attitude.
4. The extent to which program implementers require technical support from utility or other specialist consultants or advisors before the launch of the program should be examined.
5. The extent to which the program consultants need ongoing technical support should be evaluated during the pilot program.
6. An evaluation of known projects that have taken a "system approach" should be made to accurately verify the benefits gained by industry (The CEC is funding demonstration projects that could be used for this purpose).

Support for Market Transformation: The monitoring of individual projects by the CBEE, CEC or other independent organization during the first six months of program implementation should give sufficient data to evaluate the initial effectiveness of the program. Afterwards the demonstration element of the program should be designed and launched. These demonstration projects are likely to take 18 months to two years to be implemented depending on the complexity of the proposal process.

Conditions for Altering or Withdrawing Program: This program has been designed to operate for at least three years with reducing amounts of funding from the CBEE. The continuing monitoring which will also form part of the information used to market the program should give good early indication of the program's success. The program could be withdrawn at each year-end depending on the results. A solicitation or special agreement giving these year-end termination options should be a feature of this program design.

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Integrated Irrigation System Operation

A. Program Description and Objectives

Program Administrator Area: Non-residential
Program Budget: A two-year budget of $560,000 is proposed for this New Program Concept (see CEC August, 1998 for proposed budget calculations).
Program Reporting Category: Agricultural Energy Management Services, Agricultural Energy Efficiency Incentives
Program Commitment: Multi-year
Program Description and Market Transformation Plan: This Integrated Irrigation System Operation (IISO) Program offers incentives for farmers to achieve energy efficiency in their water management practices. The program will deliver technical support and cash incentives to motivate farmers to learn and invest in new irrigation systems. The program will also deliver hands-on training to farmers and farm workers. To optimize system benefits, farmers need to properly learn how to accurately manage their water and energy resources. Program implementation would occur in steps as follows:

1. Establish on-farm demonstration projects to assess energy savings resulting from program implementation. Use this information to establish the research base line of information.

2. Offer the following services to properly match the pumping system with the existing irrigation technology:
   - Conduct on-site evaluations of pumping and irrigation systems in different regions of the state and for different cropping and irrigation systems.
   - Provide an engineering analysis to properly match pumping system with the irrigation technology.
   - Implement cost-effective changes to reduce energy and water use and increase resource efficiencies.
   - Document implementation and produce educational materials to disseminate project results to other farmers.

3. Offer the following incentives to assure proper water delivery system operation:
   - Provide cash incentives to targeted groups to acquire and install data collection and analysis tools (i.e., soil moisture measurement equipment, computer hardware, irrigation scheduling software, other tools).
   - Provide hands-on training activities to teach irrigation scheduling practices, “when and how much water to apply,” (on-farm demonstrations, hands-on training courses to farmers and farm workers, workshops).
   - Establish a “real-time” evaluation process to produce feed-back to program participants and modify program implementation accordingly.
   - Document implementation and produce educational materials to disseminate project results to other farmers.

The California Energy Commission (CEC) is proposing this program concept based on the practical knowledge gained by the Commission’s Energy in Agriculture program (EAP). Since

1988, EAP has sponsored multiple activities to promote improved water management practices, in addition to cooperating with other government agencies and universities to coordinate program activities. EAP made recommendations to the Department of Water Resources (DWR) to incorporate energy analysis within the DWR-sponsored irrigation system evaluation program delivered through Resource Conservation Districts in seven regions of the state. In addition, EAP has encouraged investor-owned utilities to continue the pump test program and to expand it by also testing the motor.

However, there is a gap in the delivery of these two services. The pump test and the irrigation system evaluation are done independent of each other and no effort is made to conduct a systems engineering analysis. A systems analysis is needed to properly match the pumping system with the irrigation system. This analysis will provide a comprehensive set of recommendations to properly optimize the irrigation system operation (i.e., pump, motor, and irrigation technology). Once the system has been optimized, it is imperative that the farmer learns to irrigate following scientific water management (irrigation scheduling) practices (see NEEA Scientific Irrigation Program in activities outside California). By incorporating irrigation scheduling practices the farmer can take full advantage of an optimized water delivery system.

After the initial two years, the ISSO program will continue to increase farmer awareness of the need to use improved water management practices. The farmer will still need technical support to optimize their pumping and irrigation systems, as well as the need to learn how to irrigate using scientific methods. Although farmers can be slow in adopting new practices that require capital investment and new management practices, they will eventually (five to ten years) come to realize that they ought to invest their own funds to acquire these services. PGC funding will be critical to accelerate the adoption of these practices among the almost 80,000 farmers in the state**.**

Program Implementers and Affiliates: Water management consultants, utility staff, local, state and federal government, cooperative extension advisors, professional irrigation equipment vendors, and State university specialists.

Customer/Building Type: Agricultural

Energy End Uses: Pumping systems

End-Use Technologies, Services, Practices: Water pumps powered by electric motors, gas or diesel engines to deliver water through irrigation technologies

Customer Geographic Area: All climatic regions of the state

B. Market Transformation Characteristics

Market Event(s): This program will address equipment optimization, equipment purchase, and improved management practices.

Market Barriers Addressed: Organizational practices or customs, performance uncertainties, information and search costs, hassle and transaction costs, asymmetric information or opportunism.

Market Barriers Not Addressed: The proposed program will not be able to address access to or understanding of financing to acquire emerging irrigation technologies.

How is the Market Changing If at All? The market is slowly changing as farmers become aware of the benefits to improve water management practices. Improved water management practices can save energy, water and agricultural chemicals. Farmers have come to recognize these benefits, as well as the improvements in crop yield and quality. Farmers are also motivated

to improve water management due to the negative environmental consequences of over-irrigating crops, and the increasing public pressure to see agriculture use less water.

Other Market Transformation Activities in (or Outside) California: The State Department of Water Resources (DWR) has promoted the use of irrigation system evaluations through the *Mobile Laboratory (ML) Program*. The *Mobile Laboratory Program* offers co-sharing funds to Resource Conservation Districts in seven regions of the state. This program does not offer the pump service. In addition, the investor-owned utilities continue to provide free pump test services. However, the delivery of these two services is not integrated to produce an engineering systems analysis like the one described in this proposal.

DWR also offers the California Irrigation Management Information System (CIMIS) that provides local evapo-transpiration information via computer modem. Farmers need this information in addition to local crop coefficient information to determine when and how much water to apply. Although CIMIS continues to increase the number of users, most farmers have yet to learn how to use the system and how to manipulate the computer data. The proposed program can provide hands-on training activities to accelerate learning of the CIMIS service.

The Northwest Energy Efficiency Alliance (NEEA) *Scientific Irrigation Scheduling Program* provides information and technical assistance to expand the regional practice of scientific irrigation scheduling, which enables irrigators to use weather and soil data to supply the right amount of moisture to their crops at the right time.

Services Provided to Market Actors:
Integrated Irrigation System Operation

	Services Provided to Market Actors								
Market Actor	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Labeling, Standards	Demon-stration	Project Assist-ance	3rd-Party Experts	Other:
Farmers	Yes	Yes		Incentives		Yes	Yes	Yes	
Irr. District staff	Provide	Provide							
Designer/Specifier									
Contractors									
Retailers									
Distributors									
Manufacturers									
State DWR	Provide	Provide					Provide	Provide	
State Universities	Provide	Provide					Provide	Provide	
Other:									

C. Indicators of Program Performance

Energy or Value Indicators: Agriculture consumes 7.5% of all state electricity, including electricity used for on-farm water pumping as well as water pumped to farms from the state and federal water delivery projects. About 68% of all electricity used is for crop irrigation. Electricity is also used for fruit washing, packing, cooling, and/or drying, as well as heating and cooling greenhouses, dairy barns, and other agricultural facilities. Water pumping costs represent between 80 to 90 percent of a farmer's electricity bill. Up to 95 percent of water pumping is done using electricity; the remainder is pumped with diesel, propane or natural gas engines. Improved water management can reduce electricity costs by 25 percent. This program can benefit all farmers who use ground water pumps, booster pumps, and return-flow pumps to irrigate crops.

Potential savings from the two-year pilot program proposed are estimated at 76 GWh: an

average cost of $0.12 per kWh yields a simple rate of return of 16.29% on the program investment (see CEC August, 1998 for detailed assumptions and calculations).
Market Indicators: Expected first year savings are on the order of 5 percent of the potential 25 percent statewide savings. Over five years the market can reach a 25 to 35 percent adoption rate resulting from the proposed program implementation. Market indicators will be reflected by lower total electricity bills, reduced total water demand from irrigation districts, increased purchase of low-volume irrigation technologies, increased number of subscribers to the DWR CIMIS program, and a greater number of farmers using water management technical support services.
Program Activity Indicators: Farmers will need time to understand the proposed recommendations, to learn new scientific methods and to acquire new technologies. After the second or third irrigation season, farmers in the program will become accustomed to the new water management practices and be willing to use them in most of their production areas. Other farmers will become aware of the benefits received by those in the early adopter phase and become more interested in learning how to practice irrigation scheduling practices. Farmers will become aware of the economic and environmental benefits from using these methods.

D. Program Assessment Information

Evaluation of Assumptions: Not available
Support for Market Transformation: Market transformation may be considered to have occurred when 35 percent of farmers in a given climatic and crop region become adopters. The ultimate measure of success is achieved when farmers discuss their practices with other farmers at their local breakfast coffee shops. At this point a critical mass number of farmers have been using the practices and others are more willing to follow the recommendations.
Conditions for Altering or Withdrawing Program: The program should establish an on-going evaluation process to provide "real-time" feedback to program implementers. The program should be altered when farmers show reluctance to implement the cost-effective recommendations. It is possible they choose to not adopt due to perceived risks or other management constraints. Implementers should understand the farmers' concerns and modify program accordingly. If the concerns are behavioral, the program should determine if they can be overcome; if not, the program should be terminated. If the concerns are technical, the program should rethink the technical approach and modify the implementation phase.

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Residential Retrofit Groups of "Like" Programs in California and Other States[27]

1) Residential Information and Education (existing utility)

Residential Energy Education and Information Services (PG&E)
Mass Market Information (SCE)
Residential Information (SDG&E)
Energy Facts (SoCalGas)
AGA Energy Efficiency Advertising (SoCalGas)
Energy Star Education Project (SCE 3rd-party)
Energy Efficient HVAC Equipment and Practices for Homes (NEEP)
K-12 Energy Education (KEEP) (ECW-Wisconsin)

2) Public Sector Housing Design Guidelines and Procurement Assistance (out-of-state)

Public Housing (NEEA)
High Efficiency Refrigerators for Public Housing (CEE)

3) Centralized Procurement of Energy Efficient Appliances (3rd-party and new utility)

Energy-Efficient Apartment-Sized Refrigerator Sales (SDG&E 3rd-Party program)
CEE Residential Electric End-Use Efficiency Initiative (SCE)

4) Audits and Surveys (existing utility)

Residential Energy Management Services (PG&E)
Multi-Family Energy Management Services (PG&E)
Residential In-Home Audit and Energy Use Profile Audit (SCE)
Residential Energy Modeling Software Development (SCE and SoCalGas 3rd-party)
Residential Audit (SDG&E)
Home Energy Fitness (SoCalGas)
Helping Homeowners (SoCalGas 3rd-party)

5) Residential Energy Efficiency Training Center (existing utility)

Stockton Training Center (PG&E)

6) "Upstream" Windows Training (3rd-party and new utility)

High Performance Windows (SCE and PG&E 3rd-party)

7) Air Conditioning Contractor Training (3rd-party and out-of-state)

Residential Central Air Conditioning Service (RCACS) Program (PG&E 3rd-party)
Duct Efficiency Program (SCE, SDG&E and SoCalGas 3rd-party)
Residential Space-Conditioning Air-Distribution Systems (NEEA)

[27] Programs are listed as "Existing Utility Programs" if they include any existing utility programs, as this indicates a higher standard of documentation (i.e., regulatory filings, M&E studies, and market effects studies) should be available than for new programs.

8) Contractor Marketing (existing utility)

EnergyWise Contractor (SDG&E)

9) CHEERS Support (existing utility, 3rd-party, and out-of-state)

CHEERS Sponsorship (PG&E)
CHEERS (SCE and SoCalGas)
Peace of Mind Home Warranty (SCE and SoCalGas 3rd-party)
Developing a Sustainable Home Energy Rating System (HERS) WI Infrastructure (ECW)
HERS Expanded Components (ECW-Wisconsin)

10) Alliances/Branding/Labeling (utility and out-of-state)

Energy Star Labeling (PG&E)
Energy-Efficient Windows (PG&E)
Regional and National Alliances (PG&E)
Retail Initiative (SCE)
Energy Star Program (SDG&E)
Energy Efficient Residential Lighting (NEEP)
High Efficiency Residential Clothes Washers (NEEP)
Energy Star Residential Fixtures (NEEA)
High-Efficiency Residential Window Products (NEEA)

11) Residential Standard Performance Contract (new PY98)

Residential Standard Performance Contract (PG&E, SCE, SDG&E, SoCalGas)

12) "Downstream" Appliance Incentive (existing utility)

Super Cool - Super Clean (PG&E)
Residential Appliance Direct Rebate (SCE)
Horizontal-Axis, Coin-Operated Clothes Washer (SDG&E 3rd-party)
Super Efficient Household Appliance Standards (CEE)
Clothes Washer Standards (CEE)
National Standards (NEEA)
WashWise (NEEA)

13) Residential "Upstream" Incentives (existing utility)

Energy-Efficient Lighting Fixtures (PG&E)
Residential Fixture (SDG&E)
Horizontal Clothes Washer (SDG&E)
Residential and Small Commercial Lighting Manufacturer Incentives (CEE)
LightWise (NEEA)

14) Spare Refrigerator Recycling (existing utility)

Residential Spare Refrigerator Recycling (SCE)

15) Energy Efficiency Mortgages and Loans Program (existing utility and 3rd-party)

PG&E Comfort Link
Energy Aware Housing Agent (PG&E 3rd-party)
Residential Financing (SCE)

16) Appliance Early Retirement (new concept)

17) Integrated Residential Retrofit (new concept)

Residential Information and Education Program

A. Program[28] Description and Objectives

Program Administrator Area: Residential Retrofit
Program Budget: PY98 California PGC DSM Budget $5.7 million (Existing Utility Program). Budget information was not provided for SoCal Gas' AGA Energy Efficiency Advertising or SCE's 3rd-Party program.
Program Reporting Category: Residential Information
Program Commitment: Single year
Program Description and Market Transformation Plan: The Residential Information and Education Program provides general energy efficiency information to customers via brochures and fact sheets, telephone hotlines, displays at community events, mass media, and the Internet. The program also includes a K-8 education program. The objective of the program is to raise the general level of awareness of energy efficiency opportunities, give answers to specific customer questions, encourage customers to participate in other utility-sponsored programs, and to provide referrals to other providers of energy-efficient products and services.

With the success of customer education and heightened awareness, consumers will better understand the added value associated with purchasing energy-efficient products. Retailers will then be more likely to stock more of these products and manufacturers will continue R&D to keep up with consumer demand. Continued product design improvements will increase demand and ultimately lower the cost of products. This cycle could repeat indefinitely as new energy-efficient products are always entering the marketplace.
Program Implementers and Affiliates: Utility staff
Customer/Building Type: Single-family, multi-family, and (in SCE territory only) small commercial
Energy End Uses: All
End-Use Technologies, Services, Practices: All
Customer Geographic Area: All CEC climate zones

B. Market Transformation Characteristics

Market Event: Primary: retrofit and equipment purchase, secondary: new home purchase
Market Barriers Addressed: Performance uncertainties, information or search costs, hassle or transaction costs, asymmetric information or opportunism, bounded rationality
Market Barriers Not Addressed: Organizational practices or custom, access to or understanding of financing, misplaced or split incentives, inseparability of product features, service or product unavailability
How is the market changing (if at all)? Over one million customers have called the PG&E Smarter Energy Line (SEL) Call Center. These customers rely on the SEL to provide information to help them make informed decisions on energy efficient equipment. SEL also supports, complements, and promotes specific PG&E programs that further benefit customers in their decision making process, including the Residential Standard Performance Contract, the "Downstream" Appliance Incentive Program, CHEERS, the Alliances/Branding/Labeling Program, the Financing Program, the Energy Savings Plan Program, and the Residential Retrofit

[28] Note that for 1998 programs, "program" is the *combination* of similar utility-sponsored programs.

Program.

For example, customers might be interested in replacing their original 1965 HVAC system installed when the house was built. Before getting estimates, the customer might contact PG&E/SEL for available programs and information on "what to look for" and "what to ask the contractor". In turn, the information and/or available programs provided by the SEL allow the customer to be more aware of his energy efficiency options and ultimately make his home more comfortable.

Other Market Transformation Activities In or Outside of California: The Northeast Energy Efficiency Partnership (NEEP) *Energy Efficiency HVAC Equipment and Practices for Homes* coordinates HVAC marketing plans and provides a consumer education booklet. The Energy Center of Wisconsin (ECW) *K-12 Energy Education Program* develops K-12 energy education conceptual framework, scope and sequence guide, and curriculum in three phases.

Services Provided to Market Actors:

Residential Retrofit Customer Information Program

Market Actor	Services Provided to Market Actors							
	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Standards, Labeling	Demon-stration	3rd-Party Experts	Other: K-8 Curricu-lum
Home Owner, Property Manager	Yes		Yes					
Designer/Specifier								
Contractors								
Retailers								
Distributors								
Manufacturers								
Lending Agents								
Other: Schools								Yes

C. Indicators of Program Performance

Energy or Value Indicators: Not available; 10 year “program-weighted” measure lifetime.

Market Indicators: SDG&E Program staff has observed through interactions with customers at exhibit events that customers possess a greater understanding of the benefits of energy efficiency and recognition of the Energy Star label.

Program Activity Indicators: As of June, 1998, SoCal Gas had done “cold weather” advertising and presented energy efficiency information at the Los Angeles County Fair and Taste of Orange County; SDG&E had participated in three large community events (reaching over 170,000 people) and printed over 72,000 brochures. As of July, 1998, SCE had launched its Customer Service Center, were testing the Edison@Home service, and developing the SCE Business Center.

PG&E reported that in response to their March customer newsletter dedicated to residential energy efficiency, calls to their SmarterEnergy (SEL) energy efficiency phone hot-line almost doubled in March (19,013) and April (20,588). With only Energy Star promotion in the April bill packet, the May call volume dropped to 11,075. The number one purpose for a customer call was to request windows information, followed in order by Energy Partners, refrigerators, clothes washers and Energy Star.

PG&E’s SEL has marketed/educated customers on the benefits of horizontal-axis, tumble-

action clothes washers. This year's original goal of approximately 4,500 units has been exceeded and the new goal of 10,000 is within reach. PG&E's SEL also supports the PG&E Home Energy Savings Loan Program by educating customers interested in upgrading/retrofitting HVAC systems, insulation and windows. SEL was directly responsible for 53% of loan closures in 1997. Total loan amounts were over $55 million for 1997.

In addition PG&E developed the following new materials: home appliances fact sheet, windows fact sheet, heating fact sheet, and an energy cost calculator.

D. Program Assessment Information

Evaluation of Assumptions: not available

Support for Market Transformation: The current administrators suggest measuring the success of the program by tracking and monitoring participant satisfaction levels and assessing their knowledge of energy-efficient products and services, perhaps via on-line surveys. They also suggest tracking customer participation in other energy-efficiency programs stimulated by this program using interviews to assess the impact of the information program.

Conditions for Altering or Withdrawing Program: None provided, since the current administrators believe there will always be a need for customer information programs as new technologies, practices, and services enter the residential marketplace.

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Public Sector Housing Design Guidelines and Procurement Assistance

A. Program[29] Description and Objectives

Program Administrator Area: Residential
Program Budget: Out-of-state programs. NEEA 3-year budget of $0.32 million
Program Reporting Category: Not applicable.
Program Commitment: Multi-year
Program Description and Market Transformation Plan: The Public Sector Housing Design Guidelines and Procurement Assistance Program goal is to change public housing appliance procurement practices in the long term through 1) training procurement agents in life-cycle cost analysis; and 2) developing efficiency standards for public housing. This two-pronged effort of training and standards development is expected to continue to effect the market after the program has been completed.

The program's aim is to demonstrate to public-housing authorities the benefits of life-cycle cost analysis and resource efficiency management services, and to put those into widespread practice. This will result in lower energy bills for public housing tenants who do not get to choose their own appliances but are usually responsible for paying for their operating costs. Additionally, public housing authorities often end up paying energy bills for poorer tenants, so with this intervention they may gain the information necessary to make cost-effective decisions regarding energy-efficient appliances. The program may decide to offer incentives to manufacturers to bring the cost of efficient refrigerators sold to public housing procurement agents down to the same cost as standard efficiency units. Increasing market share of energy efficient products through government mass procurement might eventually reduce the incremental cost of production and the price of targeted appliances. Also planned is work with state and federal agencies to develop regional energy efficiency guidelines for public-housing projects in the Northwest.
Program Implementers and Affiliates: Consultants, manufacturers, distributors, housing authorities, and Consortium for Energy Efficiency.
Customer/Building Type: Multifamily
Energy End Uses: Refrigeration, space heating, space cooling, cooking.
End-Use Technologies, Services, Practices: Refrigerators, ovens/ranges, insulation, windows.
Customer Geographic Area: Northwest region, Wisconsin.

B. Market Transformation Characteristics

Market Event(s): New construction, renovation/rehab, planned replacement, emergency replacement, retrofit
Market Barriers Addressed: Organizational practices or customs, information or search costs, hassle or transaction costs, access to or understanding of financing, misplaced or split incentives, and service or product unavailability.
Market Barriers Not Addressed: Asymmetric information or opportunism
How is the market changing (if at all)? Not available.

[29] Note that for 1998 programs, "program" is the *combination* of similar utility-sponsored programs.

Other Market Transformation Activities in (or Outside) California: The Consortium for Energy Efficiency (CEE) *High Efficiency Refrigerators for Public Housing* program works with many utilities to coordinate among manufacturers and purchasing authorities the sale of energy-efficient, apartment-sized refrigerators.

Services Provided to Market Actors:

Public Sector Housing Design Guidelines and Procurement Assistance

	Services Provided to Market Actors							
Market Actor	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Standards, Labeling	Demon-stration	3rd-Party Experts	Other:
Home Owner, Property Manager		Yes		Appliance Discounts				
Designer/Specifier								
Contractors								
Retailers								
Distributors	Yes							
Manufacturers	Yes			Incentives				
Lending Agents								
Other: Local Government		Yes			Yes			

C. Indicators of Program Performance

Energy or Value Indicators: Not available.

Market Indicators: Market studies containing relevant market indicators were not available. However, national sales data from General Electric indicates that 98% of apartment-size (14 and 16 cubic foot) refrigerator sales are standard efficiency models and 2% are high-efficiency models. Intervening in mass purchases of appliances may increase market share of high efficiency appliances.

Program Activity Indicators: Not available.

D. Program Assessment Information

Evaluation of Assumptions: Purchasing agents can be surveyed after participating in the incentive program to find out if in the future, they may factor energy efficiency into their purchasing decisions in the absence of a financial incentive.

Support for Market Transformation: Follow-up surveys with procurement agents to determine purchasing decisions after program participation could reveal success of market transformation. Manufacturer reports of increased sales of high-efficiency apartment-sized refrigerators could indicate changes in procurement patterns, though its correlation with the success of this program may not be conclusive.

Conditions for Altering or Withdrawing Program: Conditions for altering or withdrawing the program depend on whether public-housing procurement agents 1) seek energy management services; and 2) purchase efficient appliances and equipment on a self-sustaining basis.

References:

Northwest Energy Efficiency Alliance. *Public Housing.* URL:http://www.nwalliance.org. 1998.

Energy Center of Wisconsin. *High Efficiency Refrigerators for Public Housing Project with the Consortium for Energy Efficiency*. URL:http://www.ecw.org/projects. 1998.

Centralized Procurement of Energy Efficient Appliances

A. Program[30] Description and Objectives

Program Administrator Area: Residential
Program Budget: PY98 California PGC DSM Budget $583,000 (3rd-Party and New Utility Programs)
Program Reporting Category: Residential Other
Program Commitment: Single year
Program Description and Market Transformation Plan: The Centralized Procurement of Energy Efficient Appliances (CPEEA) Program focuses on both public and private central purchasing/procurement authorities who decide what appliances will be installed in multi-family housing or housing projects. It supports these decision-makers by (1) establishing common specifications; (2) assisting centralized purchasing authorities at Private Multi-Family properties to make effective volume/aggregated purchases; (3) assisting local government procurement authorities to make effective volume/aggregated purchases; (4) assisting other governmental procurement and purchasing influence centers to make energy-efficient procurement decisions; (5) implementing of manufacturer/distributor (retailer) incentives, or other upstream incentive design;(6) educating centralized purchasing authorities; and (7) possibly offering 3rd-party financing.

The market transformation plan aims to shift centralized purchasing/procurement authorities towards purchasing high efficiency appliances for both public and private multi-family housing. California electric utility distribution companies and other energy efficiency program administrators will form a statewide energy-efficient purchasing influence group. The group will conduct fact-finding meetings with key purchasing personnel to form the plan. These same purchasing authority personnel will be targeted first by the initiative. Desired market effects include the following:

- Make centralized purchasing authorities more aware of highly energy-efficient appliance and device availability, and their benefits for the purchasing organization;
- Help purchasing authorities see that the price-performance relationship of the appliances and devices favor the property owner;
- Create natural market forces that encourage offers and sales of highly energy-efficient appliances and devices to centralized purchasing authorities;
- Break old "lowest cost is best" and "price and delivery-focused" purchasing habits in favor of new knowledge about the financial benefits of energy-efficient appliance acquisition;
- Develop additional manufacturer and distribution channels to serve the centralized purchasing authority markets;
- Reduce the cost of high efficiency units.

Program Implementers and Affiliates: Consultants, manufacturers, distributors, housing authorities, local government, 3rd-party contractors, and Consortium for Energy Efficiency.
Customer/Building Type: Multi-family
Energy End Uses: Refrigeration, cooking
End-Use Technologies, Services, Practices: High efficiency refrigerators, ovens/ranges
Customer Geographic Area: Southern California service territories

[30] Note that for 1998 programs, "program" is the *combination* of similar utility-sponsored programs.

B. Market Transformation Characteristics

Market Event(s): New construction, renovation/rehab, planned replacement, emergency replacement, retrofit

Market Barriers Addressed: Organizational practices or customs, information or search costs, hassle or transaction costs, access to or understanding of financing, misplaced or split incentives, and service or product unavailability.

Market Barriers Not Addressed: Asymmetric information or opportunism

How is the market changing (if at all)? Not available.

Other Market Transformation Activities in (or Outside) California: The Consortium for Energy Efficiency (CEE) is working with many utilities to coordinate among manufacturers and purchasing authorities the sale of energy-efficient, apartment-sized refrigerators.

Services Provided to Market Actors:

Centralized Procurement of Energy Efficient Appliances

	Services Provided to Market Actors							
Market Actor	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Standards, Labeling	Demon-stration	3rd-Party Experts	Other: Procure-ment Assist-ance
Home Owner, Property Manager				Financing				Yes
Designer/Specifier								
Contractors								
Retailers								
Distributors				Incentives				
Manufacturers				Incentives				
Lending Agents								
Other: Local Government								Yes

C. Indicators of Program Performance

Energy or Value Indicators: SDG&E's Third Party program is projected to save 1,225 MWh per year; 15 year program-weighted measure lifetime. No TRC data or cost effectiveness information are available. However, given that the targeted technologies are cost-effective, bulk purchases will be made, and the program costs should be low, the program should be highly cost-effective.

Market Indicators: National sales data from General Electric indicates that 98% of apartment-sized (14 and 16 cubic foot) refrigerators sold are standard efficiency models and 2% are high-efficiency models. Intervening in mass purchases of appliances may increase market share of high efficiency appliances.

Program Activity Indicators: As of July, 1998, meetings had been held between SDG&E's third-party program provider and General Electric. Suppliers had placed orders for units in anticipation of future sales and initial sales reports on program activity were expected shortly.

D. Program Assessment Information

Evaluation of Assumptions: Purchasing agents can be surveyed after participating in the incentive program to find out if in the future, they may factor energy efficiency into their

purchasing decisions in the absence of a financial incentive.

Support for Market Transformation: Follow-up surveys with procurement agents to determine purchasing decisions after program participation could reveal success of market transformation. Manufacturer reports of increased sales of high-efficiency apartment-sized refrigerators could indicate changes in procurement patterns, though this program would not necessarily be the cause.

Conditions for Altering or Withdrawing Program: Public housing authorities often are forced to foot the energy bill in cases of low-income tenancy. In these situations, the split incentives typical of private multi-family housing developments does not exist and housing authorities may learn to cost-effectively absorb the added first cost of energy efficient appliances without financial incentives. In private multi-family housing situations where incentives are split, financial incentives may always be necessary to influence mass procurement decisions and increase the energy efficiency of appliance stocks. While information and hassle costs of investigating the energy efficiency levels of appliances may always be a barrier for purchasing agents, if manufacturers/distributors internalize the task of pitching the sale of more efficient equipment, this barrier may be overcome.

References:

GE Appliances and Planergy, Inc., *Third-Party Initiative for an Energy Efficient Apartment-Sized Refrigerator Sales Program*, December 8, 1997.

Southern California Edison Company. *Appendix B to the Testimony of Southern California Edison in Support of the 1998 DSM Program Funding*. Rosemead, CA. October 1997

Southern California Edison Company. *Extension of 1998 Energy Efficiency Program Plans and Performance Award Mechanisms.* Rosemead, CA. June 1998.

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San Diego Gas and Electric Company. *1998 Second Quarter Program Status Update.* July 1998.

Audits and Surveys Program

A. Program[31] Description and Objectives

Program Administrator Area: Residential
Program Budget: PY98 California PGC DSM Budget $8.4 million (Existing Utility Program). Budget information for SCE and SoCal Gas 3rd-Party Residential Retrofit Energy Modeling Software Development programs were not provided.
Program Reporting Category: Residential Energy Management Services
Program Commitment: Single year
Program Description and Market Transformation Plan: The Audits and Surveys (A&S) Program provides direct mail, telephone, web-based, and on-site surveys and audits to increase customer awareness of energy efficiency opportunities in their homes and encourage them to adopt specific measures. This is done via written reports, telephone conversations, and/or personal visits by utility field staff. The reports or visits also convey information about how to contact suppliers of energy-efficient products and services and access other utility resources (such as incentive programs). A compact fluorescent lamp is sometimes given to participating customers to thank them for their participation and promote the use of CFLs. The A&S Program supports and complements additional programs under the residential programs banner, including the Residential Standard Performance Contract, the "Downstream" Appliance Incentive Program, CHEERS, the Alliances/Branding/Labeling Program, and the Financing Program. Additionally, the A&S Program assists other programs in identifying greatest energy and cost-saving opportunities.

The A&S Program is intended to transform the market for many energy-efficient products and services by increasing customer awareness of energy savings (leading to bill savings) in their homes or in the properties they manage. The customer not only learns about specific opportunities to use energy-efficient technologies, but also learns how to use lifecycle costing methods to make better purchasing decisions in the future. It is thought that once customers have participated in the program, they will purchase more energy-efficient equipment for their homes. This is expected to have a cumulative effect on the demand for many energy-efficient products and services, eventually increasing their market share and perhaps lowering their initial cost.
Program Implementers and Affiliates: Utility staff, local government, 3rd-party contractors, and consultants
Customer/Building Type: All residential, with emphasis on single-family detached homes, condominiums, town homes and customers with higher than average energy usage who have lived in their homes for more than seven years.
Energy End Uses: All
End Use Technologies, Services, Practices: All
Customer Geographic Area: All CEC climate zones, but emphasis on colder climates

B. Market Transformation Characteristics

Market Event: Equipment purchase, remodeling
Market Barriers Addressed: Information/search costs, hassle/transaction costs, asymmetric information/opportunism, performance uncertainty, bounded rationality, organizational practices

[31] Note that for 1998 programs, "program" is the *combination* of similar utility-sponsored programs.

or custom (for multi-family property managers only), and access to or understanding of financing.
Market Barriers Not Addressed: Misplaced or split incentives, inseparability of product features, and service or product unavailability
How is the market changing (if at all)? Not available
Other Market Transformation Activities in (or Outside) California: None identified
Services Provided to Market Actors:
Audits and Surveys Program

	Services Provided to Market Actors							
Market Actor	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Standards, Labeling	Demon-stration	3rd-Party Experts	Other:
Home Owner, Property Manager	Yes (Info. & Audits)							
Designer/Specifier			Customer Contacts					
Contractors			Customer Contacts					
Retailers								
Distributors								
Manufacturers								
Lending Agents								
Other: Local Government	Yes							

C. Indicators of Program Performance

Energy or Value Indicators: Preliminary estimates of 1st year electricity savings are 15.7 GWh and 1,504,000 therms. 10 year "program-weighted measure lifetime. TRC tests were available for four out of six programs within this program group. Cost effectiveness as suggested by these TRC tests ranges from range from 0.48 for SDG&E Residential Audit Program, 0.90 for PG&E's Multifamily Program, 0.93 for PG&E's Residential Energy Management Services Program, to 2.29 for SoCal Gas' Home Energy Fitness Program. The program-budget-weighted average TRC is 0.92.

A concrete example of energy savings deriving from residential audits and surveys is provided in a case study by the Global Cities Project. The City of Santa Monica's Energy Fitness Program was a six-month pilot home energy audit program considered to be one of the most successful of its kind in the country. The program sent out teams of energy technicians to audit and retrofit residences with energy-efficient devices free of charge. This program resulted from the National Residential Conservation Service Program, and reportedly reached 5,000 residences and installing 13,000 energy-saving devices during the six-month period it was administered. Santa Monica succeeded in registering a participation rate of approximately 35 percent for its Energy Fitness Program compared to the 3-5 percent participation rate of eligible customers obtained in traditional Residential Conservation Service Programs. The City also succeeded in involving traditionally hard-to-reach customers such as multi-family residences who accounted for 65 percent of the completed audits, and low -income households that accounted for 12 percent of the completed audits. The City estimated the accrued dollar savings resulting from these retrofits at an annual $500,000. After one year, 12,485 audits were conducted and 300,154 weatherization devices were installed free of charge. The City estimated that the participating residents saved a total of $314,000 in utility bills.

Market Indicators: Formal studies of market indicators for the Customer Surveys and Audits program are not yet available but are near completion.

Program Activity Indicators: As of May 1998, SDG&E had completed over 4,500 in-home and mail-in audits, launched and had 150 participants in their residential on-line audit. SCE had completed a total of 3,573 in-home audits (47% of goal), 1,001 telephone audits (40% of goal), and 7,422 Energy Use Profiles (35% of goal). As of June 1998, SoCalGas had added electric efficiency recommendations to their Home Energy Fitness surveys and begun mailings. As of July 1998, PG&E had completed 26,962 surveys and established certification training and conducted 1998 program update training for 53 energy specialists.

D. Program Assessment Information

Evaluation of Assumptions: Not available

Support for Market Transformation: The utilities suggest counting the number of customers implementing projects or taking action and assessing changes in customers' understanding and awareness about the benefits of energy efficiency following a survey or audit. Both types of data could be collected via surveys, but it would be difficult to attribute project implementation or other action to the Surveys and Audits Program alone.

Conditions for Altering or Withdrawing Program: Only SCE and SoCalGas provide descriptions of how and when their programs would be phased out or "exit" as the market is transformed in their October, 1997 advice letter to the CPUC.

SCE sets certain targets and conditions which, if met, would indicate that customers no longer need Residential Energy Management Services. These include demonstrating that the audit has been offered to 75% or more of all eligible customers within the last three years, and demonstrating that the program is having minimal or no impact on participant's attitudes, knowledge and behavior with regard to energy efficiency. Post-audit surveys and pre/post analysis of electricity use, equipment, and energy-use practices can be used to analyze program impact.

SoCalGas describes a "transformed" market as one in which homeowners are saturated with energy efficiency information and would continue to demand efficient products, services, and financing options in the absence of the Home Energy Fitness Program. However, no private sector market actors have shown interest in providing this product to this sector.

References:

Eto, J., Prahl R., and J. Schlegel. *A Scoping Study on Energy-Efficiency Market Transformation by California Utility DSM Programs*. (LBNL-39058). Lawrence Berkeley National Laboratory. Berkeley, CA. 1996.

Global Cities Project. http://www.globalcities.org. *Energy Efficiency Case Studies,* 1998.

Pacific Gas and Electric Company. *Application of Pacific Gas and Electric Company for Approval of 1998 Energy Efficiency Programs, Shareholder Incentive Mechanism for 1998 Programs, as Cost Accounting Process for Transfer of Surcharge Funds, and Update of Energy Efficiency Commitments*. San Francisco, CA. October 1997.

Pacific Gas & Electric Co., *1998 Customer Energy Efficiency Programs, Advice Filing 2086-G/1776-E, Attachments.* San Francisco, CA. June 1998.

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Southern California Gas Company. *Second Quarter Program Review.* July 1998.

Residential Energy Efficiency Training Center

A. Program[32] Description and Objectives

Program Administrator Area: Residential (primarily, but overlaps with Nonresidential)
Program Budget: PY98 California PGC DSM Budget $840,000 (Existing Utility Program). Note: The Center also receives $250,000 from the LIGB Energy Partners Program.
Program Reporting Category: Residential Information, Residential Energy Management Services, Direct Assistance, Other (overlaps with Nonresidential Information, Commercial Energy Management Services, and Industrial Energy Management Services)
Program Commitment: Multi-year
Program Description and Market Transformation Plan: The Residential Energy Efficiency Center (REEC) offers training for implementers of Standard Performance Contract programs, third party programs, low income weatherization installers and educators, residential energy auditor certification, quality assurance inspectors, residential retrofit contractors, home energy raters, and new home builders and sub-contractors. The REEC also offers industrial training on wastewater treatment plants, new technologies for motors, lighting, commercial and industrial refrigeration, boilers, industrial process water treatment technologies and maintenance and operations for energy efficiency of facilities including compressed air system repairs.

The primary market transformation objective of the REEC is to overcome information barriers to energy efficiency implementation. Extensive laboratories and a demonstration home enable students to thoroughly and quickly learn to assess, install, and market efficient products and to educate consumers. Financing programs are facilitated by educating lenders and realtors about the benefits of energy efficient mortgages. Energy consultants, raters, and builders learn how to cost effectively meet EPA "Energy Star" efficiency levels in new homes. It is expected that this combination of training programs for residential market actors will help create the "educated" populace upon which the success of many energy-efficiency efforts depends.
Program Implementers and Affiliates: Utility staff, consultants
Customer/Building Type: The program is focused primarily on the retrofit and new construction residential market, with some services for commercial and industrial facilities.
Energy End Uses: HVAC, lighting, water heating, refrigeration, motors, boilers, industrial process water treatment, compressed air systems.
End-Use Technologies, Services, Practices: Weatherization, insulation, duct sealing, windows, lighting, water heaters, HVAC, water saving technologies, refrigeration, motors, wastewater treatment, compressed air systems, pumps
Customer Geographic Area: Central and Northern California

B. Market Transformation Characteristics

Market Event(s): Primary: renovation/rehab with or without Title-24. Secondary: new construction.
Market Barriers Addressed: Performance uncertainties, information or search costs, hassle or transaction costs, asymmetric information or opportunism, access to or understanding of financing, organizational practices or customs
Market Barriers Not Addressed: Bounded rationality, misplaced or split incentives,

[32] Note that for 1998 programs, "program" is the *combination* of similar utility-sponsored programs.

inseparability of product features, and service or product unavailability

How is the market changing (if at all)? Demand continues to be strong for hands-on training from auditors, inspectors, contractors, vendors, manufacturers and builders.

Other Market Transformation Activities in (or Outside) California: For a discussion of other Energy Efficiency Training Centers such as Southern California Edison's CTAC and AgTAC see the Energy Efficiency Centers under the nonresidential administrator area.

Services Provided to Market Actors:

Residential Energy Efficiency Training Center

	Services Provided to Market Actors							
Market Actor	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Standards, Labeling	Demon-stration	3rd-Party Experts	Other:
Home Owner, Property Manager	Yes							
Designer/Specifier	Yes	Yes				Yes		
Contractors	Yes	Yes				Yes		
Retailers								
Distributors	Yes	Yes				Yes		
Manufacturers	Yes	Yes				Yes		
Lending Agents	Yes	Yes						
Other: Energy Auditors, Building Inspectors, Water and Wastewater Gov't Agents	Yes	Yes				Yes		

C. Indicators of Program Performance

Energy or Value Indicators: Not available.

Market Indicators: While formal market indicators are not yet available for the first year of operation of the program PG&E states in its July, 1998, report to the CPUC that training classes for window installers have attracted the interest of the American Architectural Manufacturers Association (AAMA). AAMA plans to create a national installer certification process and conduct pilot training this year. The utility also reports recent discussions with the California Energy Commission (CEC) and CALBO showing potential collaboration will foster a sustained, leveraged effort. Industrial market actors who have attended the industrial sessions have given this educational effort very high marks, as it is the only education that addresses energy efficiency in industrial systems in a comprehensive manner.

As part of the PG&E Comfort Home training program for high efficiency duct installation, 9 firms were trained (4 sessions) and certified to perform high efficiency duct installations as of Aug. 20 of 1998. Contractors now perform system closure according to program standards and certify duct installations using duct testing equipment which they would otherwise not be using. At least two more classes are pending.

As part of high efficiency duct training for Siskiyou County Building Department, 8 building inspectors were trained in codes and standards related to current changes in duct closure systems, and requirements for diagnostic testing for 1999 Title 24 ACM (Alternative Compliance Manual). Pre-Post test scores and evaluations indicated that inspectors knowledge in duct closure systems and testing was extremely limited prior to the training and drastically increased after the training. The building department found the knowledge essential for future ACM related

inspections.

As part of CHEERS Diagnostic Testing for Alternative Compliance Manual (ACM) Verifications, 14 CHEERS Raters were trained (2 training sessions) in diagnostic testing procedures for verification of PCH+ Program inspections. 5 of the 14 Raters were previously trained in diagnostic testing within REEC classes prior to 1998. 13 of 14 Raters learned how to apply diagnostic testing equipment having never used the equipment prior to training. Raters apply skills directly to PCH+ homes under the CHEERS rating process.

In support of the Standard Performance Contract Program, two types of training sessions were conducted. The conventional home duct diagnostics, repair and sealing training was the first in a series of classes held at the request of the program manager to stimulate technology transfer of diagnostic testing and advanced duct closure system sealing techniques. One contractor went through the training and is directly applying techniques learned within High Efficiency System Replacement component of Residential Standard Performance Contract program. Two energy efficient water heating measures training sessions were held at the REEC. Participants are now able to wrap hot and cold water pipes, install safely, securely and effectively water heater insulation blankets, and accurately test flow of existing shower heads for compliance with program replacement standards.

Two compressed air system and packaged HVAC system monitoring training sessions were held to support Building Commissioning efforts. 15 monitoring reps are testing the concept of system monitoring with state-of-the-art data loggers and custom-designed software to analyze data. This concept will be transferred to HVAC and compressed air system trade professionals in sessions later in 1998, for inclusion in their service contracts with end-use customers.

Program Activity Indicators: As of August 20, 1998, PG&E's Stockton Training Center had conducted 94 classes total, with 69 of them for 1998 CBEE Programs Administered by PG&E including training for its own employees and numerous external personnel implementing such programs. The remaining 25 classes were for "market actors" external to Programs Administered by PG&E. Market Actors trained include: Standard Performance Contract Implementers, CHEERS Raters, Title 24 Energy Consultants, Building Inspectors, HVAC Equipment Distributors, Window Manufacturers, HVAC Sub-Contractors, and the Wastewater Treatment and Industrial Pumping groups.

D. Program Assessment Information

Evaluation of Assumptions: Critical assumptions are the energy-efficiency training and education will result in higher quality installations, greater sales and increased demand for energy efficiency products and practices. Contractors, builders, sales staff, and lenders can be surveyed after participating in REEC training and education classes to find out if the training is successful. Non-participants can also be surveyed to assess future training and educational objectives.

Support for Market Transformation: The REEC asks class participants to evaluate the degree to which classes have provided them with new skills. In addition to this qualitative measure, the Center also keeps track of the number of class participants and certificates awarded. In addition, many of the training courses are aimed at providing critical training, technical assistance and performance consulting support for particular efficiency programs. As such, the success of the REEC can be judged in part by the success of the programs it supports.

Conditions for Altering or Withdrawing Program: Class participation and change in installation competency and use of new information within business practices will be a key

indicator of whether the REEC is reaching its target audience. If class participation is low, the program should be altered to better respond to customer needs and interests. As the information barrier is high and ongoing in the residential market, no conditions are anticipated under which the program could be withdrawn.

References:

Pacific Gas & Electric Company. *Application of Pacific Gas and Electric Company for Approval of 1998 Energy Efficiency Program, Shareholder Incentive Mechanism for 1998 Programs, a Cost Accounting Process for Transfer of Surcharge Funds, and Update of Energy Efficiency Commitments.* San Francisco, CA. 1997.

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"Upstream" Windows Training Program

A. Program Overview

Program Administrator Area: Residential
Program Budget: PY98 California PGC DSM Budget $750,000 (3rd-Party Programs)
Program Reporting Category: Residential information
Program Commitment: Single year
Program Description and Market Transformation Plan: The "Upstream" Windows Training (UWT) Program provides mid and upstream market actors with training related to the energy aspects of their products. The program is provided by a third party under contract to PG&E.

The market transformation plan is to empower upstream market actors with the information they need to more effectively market their energy-efficient window products. Once it is shown that such products can increase sales and profit, it is expected that manufacturers will provide such training themselves, either by contracts with a third party or internally. Ultimately, the prevalence of upstream training activities is expected to increase market penetration (both speed and scope) of new energy-efficient window technologies.
Program Implementers and Affiliates: Consultants (this is a third-party initiative)
Customer/Building Type: Customer: residential Building Type: single family, multifamily
Energy End Uses: HVAC, lighting (daylighting)
End Use Technologies, Services, Practices: Efficient windows
Customer Geographic Area: Central and Northern California

B. Market Transformation Characteristics

Market Event: Retrofit and new construction
Market Barriers Addressed: Performance uncertainties, asymmetric information or opportunism, inseparability of product features, information or search costs
Market Barriers Not Addressed: Organizational practices or customs, hassle or transaction costs, bounded rationality, access to or understanding of financing, misplaced or split incentives, and service or product unavailability
How is the market changing (if at all)? Not available
Other Market Transformation Activities In or Outside of California: None identified
Services Provided to Market Actors:
"Upstream" Windows Training Program

	Services Provided to Market Actors							
Market Actor	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Standards, Labeling	Demon-stration	3rd-Party Experts	Other:
Home Owner, Property Manager	Yes							
Designer/Specifier								
Contractors	Yes	Yes						
Retailers	Yes	Yes						
Distributors	Yes	Yes						
Manufacturers	Yes	Yes						
Lending Agents								
Other:								

C. Indicators of Program Performance

Energy or Value Indicators: Data being collected

Market Indicators: Not available

Program Activity Indicators: Not available

D. Program Assessment Information

Evaluation of Assumptions: This program relies on the assumption that window manufacturers and sellers are not aware of how they could take better advantage of the energy-efficient features of their products to increase market share. Information about how the program intends to test this assumption is not available.

Support for Market Transformation: The market research being carried out as a part of the project will indicate the degree to which the window sellers and installers contacted have indeed changed their practices as a result of the training. Whether these effects will be carried over to non-participants will depend on whether non-participants are aware of the program and of any competitive advantages participants are gaining as a result of their expertise in energy efficiency. This could be assessed through a separate market research study.

Conditions for Altering or Withdrawing Program: If participation is low, program implementers will need to re-evaluate how to best capture the attention of the targeted market actors. This should be assessed mid-way through the program. If the program is a success, window manufacturers should be willing to pay for such training services in order to continue increasing sales and market share. The program might continue to offer training at a subsidized rate, gradually decreasing PCG support as more window manufacturers and sellers are willing to contract for such services or provide them internally. A major contributing factor to this effort's success is the development and delivery of a customer loan program. A loan program is vital to support the downstream market transformation effort but will send a strong market signal to the upstream market that there is "support" and commitment for this effort. In addition, a loan program serves as the catalyst for facilitating the purchase of high performance windows and enhancing consumer demand.

References:

Pacific Gas and Electric Company. *PG&E's Third Party Proposal Program Specific Conditions - High Performance Window Program*. 1998.

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Air Conditioning Contractor Training Program

A. Program[33] Description and Objectives

Program Administrator Area: Residential Retrofit
Program Budget: Budgets are available for two of the five programs in this category. The PY98 California PGC DSM budget for these two programs is $630,000. The programs in this category are 3rd-Party and out-of-state programs.
Program Reporting Category: Residential Other
Program Commitment: Single year
Program Description and Market Transformation Plan: The Air Conditioning Contractor Training (ACCT) Program provides HVAC and sheet metal contractors with the information, procedures, and technologies (including diagnostic software) they can use to market air conditioner tune-ups and duct leakage inspection and repair through a series of seminars and workshops. The program also provides participating contractors with a toll-free technical support telephone line and marketing support.

The market transformation plan is to teach contractors to use software tools, and new procedures/technologies for air conditioner and duct inspection and repair. At the same time, residential customers will be educated (through marketing materials) about the value of home furnace and air conditioner system maintenance and how to obtain a quality contractor to perform such work. It is hoped the combination of these efforts will demonstrate that these services (particularly duct inspection and repair) can be profitable, viable business activities for HVAC and sheet metal contractors.
Program Implementers and Affiliates: Consultants (this is a third-party program), utility staff
Customer/Building Type: single family and multi-family residential
Energy End Uses: Space heating and cooling
End-Use Technologies, Services, Practices: Duct inspection and duct sealing, air conditioner maintenance
Customer Geographic Area: All

B. Market Transformation Characteristics

Market Event: Operation and maintenance
Market Barriers Addressed: Organizational practices or customs, performance uncertainties, information or search cost, asymmetric information or opportunism, service or product unavailability
Market Barriers Not Addressed: Bounded rationality, access to or understanding of financing, misplaced or split incentives, hassle or transaction costs
How is the market changing (if at all)? PG&E, Lawrence Berkeley Laboratory, the California Energy Commission, and others have estimated that from 20 to 40 percent of the energy used for space heating or space cooling in houses can be lost due to leakage from forced air ducts. Despite the magnitude of the energy thus being lost, the number of firms offering duct inspection and repair services is small. The California Energy Commission has identified duct leakage in houses as a problem to be addressed, with duct leakage as high as 28 percent even in new houses. A major culprit in causing duct leaks is duct tape that deteriorates too rapidly. Starting in 1999 the

[33] Note that for 1998 programs, "program" is the *combination* of similar utility-sponsored programs.

CEC will allow credit to be taken for reducing duct leakage in newly built houses within the context of Title 24 standards. However, these provisions do not do anything to encourage detecting and repairing duct leaks in *existing* houses. There is also concern whether there is a sufficient number of contractors who are able to provide duct inspection and repair services.

Other Market Transformation Activities In (or Outside) California:

The Northwest Energy Efficiency Alliance (NEEA) *Residential Space-Conditioning Air-Distribution Systems Program* has two primary goals: 1) establish retrofitting of leaky residential air-distribution (duct) systems as a viable and profitable business around the Northwest; and 2) create sustained demand for efficient duct systems in new homes.

Services Provided to Market Actors:

Air Conditioning Contractor Training Program

Market Actor	Services Provided to Market Actors							
	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Standards, Labeling	Demon-stration	3rd-Party Experts	Other: Tech. Support Hotline
Home Owner, Property Manager								
Designer/Specifier								
Contractors	Yes	Yes						Yes
Retailers								
Distributors								
Manufacturers								
Lending Agents								
Other:								

C. Indicators of Program Performance

Energy or Value Indicators: Cost-benefit information was provided for the PG&E 3rd-party Duct Efficiency Training Program. Projected 1st year savings are 180 MWh, 60 kW, and 36,000 therms (based on engineering calculations and expected market penetration). Cost effectiveness as suggested by the TRC test is 1.18 (ADM 1998); 10 year "program-weighted" measure lifetime. Supplemental cost-effectiveness calculations and supporting documentation were provided by ADM (see references).

Market Indicators: In the short term, the market indicators for the ACCT Programs are the following: 1) number of HVAC contractors trained to provide duct inspection and repair services; and 2) number of customers requesting duct inspection and repair services.

Program Activity Indicators: As of June 1998, duct efficiency training materials had been developed by the third-party contractor for the Duct Efficiency Program (SCE, SDG&E and SoCal Gas). No information is available on the activities of PG&E's third-party RECACS program.

D. Program Assessment Information

Evaluation of Assumptions: Surveys of participating and nonparticipating contractors will provide an indication of success for the ACCT Program.

Support for Market Transformation: In the short term, the success of the ACCT Program could be assessed by:

- analyzing field and market survey data to estimate the number of customers receiving an air

conditioner tune-up with the diagnostic software vs. the total number of customers who received a/c tune-ups in the program area,
- surveying HVAC contractors to determine the change in the number of firms willing and able to supply duct inspection and repair services because of the program, and
- surveying households and small commercial building owners to ascertain their willingness to purchase duct inspection and repair services.

In the long term, the current Administrators intend to use surveys of customers, contractors, and service technicians to ascertain any measurable changes in the attitude, knowledge, and service provider market structure brought about by the program.

Conditions for Altering or Withdrawing Program: The duct inspection and repair element of the program could be withdrawn when it becomes a "viable" business for HVAC installation and maintenance contractors. The third-party experts who are administering this program estimate this will occur when 20 to 30 percent of HVAC installation and maintenance contractors have been trained and provided with marketing guidance and materials.

References:

ADM Associates, Inc. *Air Conditioning Contractor Training Program Supplemental Cost Effectiveness Calculations.* 1998.

ADM Associates, Inc. *Duct Efficiency Program Technical and Cost Proposal (3rd-Party Proposal).* ADM Associates, Sacramento, CA. 1997.

Pacific Gas and Electric Company. *PG&E's Third Party Proposal Program Specific Conditions: Residential Central Air Conditioning Service (RECACS) Program*. 1998.

San Diego Gas and Electric Company. *Third Party Initiatives Program Provider - Administrator Agreement, Agreement Number: TPIP-004.* 1998. (Duct Efficiency Program)

San Diego Gas and Electric Company. *1998 Second Quarter Program Status Update.* July 1998.

Southern California Gas Company. *Third Party Initiatives Program Provider - Administrator Agreement, Agreement Number: P13396.* 1998. (Duct Efficiency Program)

Northwest Energy Efficiency Alliance. Residential Space-Conditioning Air-Distribution Systems. URL:http://www.nwalliance.org. 1998.

Contractor Marketing Program

A. Program Description and Objectives

Program Administrator Area: Residential Retrofit
Program Budget: PY98 California PGC DSM Budget $580,000 (Existing Utility Program)
Program Reporting Category: Residential Other
Program Commitment: Single year
Program Description and Market Transformation Plan: The Contractor Marketing Program helps contractors advertise their services and provides them with the necessary materials to be able to explain to consumers the benefits of making energy-efficient choices when remodeling. The program will do this through a general advertising campaign explaining the benefits of energy-efficient building products and encouraging customers to use participating contractors.

The Contractor Marketing Program's market transformation plan is to link up educated customers with progressive contractors who are willing to consistently offer energy-efficient products when bidding and specifying remodeling work. Over time, such contractors will be more successful than those that do not offer energy-efficient products, making it more likely that customers will select one of them to perform home remodeling work.
Program Implementers and Affiliates: Utility staff, contractors
Customer/Building Type: All residential
Energy End Uses: All
End-Use Technologies, Services, Practices: All
Customer Geographic Area: All CEC climate zones

B. Market Transformation Characteristics

Market Event(s): Primary: renovation (w/o Title 24); secondary: planned replacement, retrofit
Market Barriers Addressed: Information or search costs, hassle or transaction costs, asymmetric information/opportunism, service or product unavailability
Market Barriers Not Addressed: Performance uncertainties, access to or understanding of financing, misplaced or split incentives, inseparability of product features
How is the market changing (if at all)? Not available
Other Market Transformation Activities in (or Outside) California: None identified.
Services Provided to Market Actors:
Contractor Marketing Program

	Services Provided to Market Actors							
Market Actor	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Standards, Labeling	Demon-stration	3rd Party Experts	Other:
Home Owner, Property Manager	Yes							
Designer/Specifier								
Contractors	Yes		Customer Contacts					
Retailers								
Distributors								
Manufacturers								
Lending Agents								
Other:								

C. Indicators of Program Performance

Energy or Value Indicators: Energy savings information not available; 15 year program-weighted measure lifetime

Market Indicators: Formal studies of market indicators are not available, but SDG&E states in its July, 1998 report to the CPUC that contractor response to the concept of the EnergyWise program has been very positive. Contractors feel that the information being provided to customers is a necessary tool to be able to educate them on the benefits of incorporating energy efficient products into their remodeling projects.

Program Activity Indicators: As of May, 1998, designs for program collateral (brochures, ads, etc.) had been finalized and readied for distribution to contractors and customers. Contractor participation agreements and customer forms had been designed and produced. The first wave of potential participants were identified and solicitation begun, and various contractors had already expressed interest in being part of the program. As of June 30, 1998, eight contractors had signed up to participate in the program.

D. Program Assessment Information

Evaluation of Assumptions: Not available

Support for Market Transformation: Not available

Conditions for Altering or Withdrawing Program: Not provided

References:

San Diego Gas and Electric Company. *Testimony of Yolanda A. Whiting Before the Public Utilities Commission of the State of California*. October 1997.

San Diego Gas and Electric Company. *Advice 1104-E/1100-G 1998 Energy Efficiency Program Plans and Budgets.* June 1998.

San Diego Gas and Electric Company. *1998 Second Quarter Program Status Update*. July, 1998.

California Home Energy Efficiency Rating System (CHEERS) Support Program

A. Program[34] Description and Objectives

Program Administrator Area: Residential Retrofit
Program Reporting Category: Residential Other
Program Budget: PY98 California PGC DSM Budget $1.6 million (Utility, 3rd-Party, and Out-of-State Programs)
Program Commitment: Multi-year
Program Description and Market Transformation Plan: The CHEERS Support Program provides marketing and customer education for home energy ratings and energy-efficient mortgages/loans. The program offers subsidized CHEERS energy audits in the SoCal Gas and SCE service territories, or free audits to customers who buy a home mechanical system (HVAC and water heater) service subscription. The service subscription includes mechanical and water heater safety inspections, 24-hour service dispatch, direct installation of simple water heater measures, and low interest energy conservation (ECM) project financing packages. The objective of the program is to encourage wide-spread use of CHEERS as a means for residential customers to obtain greater access to financing for energy efficiency improvements or home purchase.

The plan is to transform the market for energy-efficient home improvements by encouraging customers to get a CHEERS audit from a certified rater[35]. The audit results show the homeowner what steps could be taken to improve efficiency and comfort, but also open the door to attractive options for financing such improvements and (in some areas) other value-added services. It is thought that reduced information and financing barriers coupled (in some areas) with an on-going relationship with mechanical system service providers will lead to greater demand for a variety of energy-efficient products and services in the residential market. Currently, CHEERS ratings are used in new construction to differentiate houses on the market, allow access to energy-efficiency mortgages (EEMs), and to qualify homes for the EPA Energy Star and PG&E Comfort Home Plus programs. Ultimately, this could lead to greater demand for more efficient new homes.
Program Implementers and Affiliates: Utility staff, contractors, financing agencies
Customer/Building Type: Single-family homes
Energy End Uses: All, but focus on space heating, cooling and water heating
End- Use Technologies, Services, Practices: All, but focus on high efficiency central air conditioners and water heaters (in Southern California Climates, Northern California focus can broaden to furnaces, tight ducts, shell infiltration and insulation). Also installation of energy efficient appliances and home mechanical systems, HVAC control thermostats, water heater wraps, compact fluorescent lamps, low flow showerheads, toilets and faucet aerators, insulation upgrades, weatherization, installation of whole house fans, window/door upgrades.
Customer Geographic Area: All CEC climate zones

[34] Note that for 1998 programs, "program" is the *combination* of similar utility-sponsored programs.
[35] Note that certified CHEERS raters are not in the employ of the non-profit CHEERS organization, but are individuals who complete CHEERS training and sign a contract with the organization indicating they will adhere to certain quality control standards.

B. Market Transformation Characteristics

Market Event: Primary: remodeling/home improvement, secondary: home purchase
Market Barriers Addressed: Performance uncertainties, information or search costs, hassle or transaction costs, asymmetric information or opportunism, access to or understanding of financing, misplaced or split incentives, hidden costs
Market Barriers Not Addressed: Organizational practices, bounded rationality, inseparability of product features, and service or product unavailability
How is the market changing (if at all)? While approximately 30% of California homes have received either basic or detailed energy efficiency audits in the past 15 years, fewer than 1% of California homes have implemented energy conservation measures in that time.[36]
Other Market Transformation Activities in (or Outside) California: Energy Star Homes (EPA). The Energy Center of Wisconsin (ECW) *Developing a Sustainable Home Energy Rating System (HERS) WI Infrastructure* supports marketing and expansion efforts of the Home Energy Rating System/Energy Efficient Mortgage (HERS/EEM) project, already underway, sponsored by the Wisconsin Energy Bureau. The project trains contractors to do home energy ratings, home improvement analyses, financing, and contractor arranging for improvements. The ECW *HERS Expanded Components* project expands on HERS marketing efforts by providing marketing coordination and support and customer marketing activities in the forms of focus group research, homebuyer seminars, case studies, direct mail, bank/realtor lobby displays, cooperative advertising, lender and realtor focus groups, lender and realtor sales calls, builder and contractor sales calls, rater marketing and technical update meetings, and custom lender and realtor service packages.
Services Provided to Market Actors:
CHEERS Support Program

	Services Provided to Market Actors							
Market Actor	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Standards, Labeling	Demon-stration	3rd Party Experts	Other: CHEERS Audits
Home Owner, Property Manager				Subsidies for audits and ECMs				Yes
Designer/Specifier								
Contractors								Provide
Retailers								
Distributors								
Manufacturers								
Lending Agents	Yes				Yes			
Other: CHEERS Energy Raters	Yes							Provide

C. Indicators of Program Performance

Energy or Value Indicators: Not available; 15 year "program-weighted" measure lifetime
Market Indicators: No formal studies of market indicators are available, but PG&E reported in its July, 1998 report to the CPUC that CHEERS rating volume is increasing based on the HUD/FHA partnership. CHEERS is bringing together energy consultants, raters, builders, and EPA to capitalize on the Energy Star Home Program. The utility believes implementation of

[36] *Third Party Initiatives Proposal Submitted to Southern California Gas Company* by The Service Institute.

residential commissioning and diagnostic testing of home HVAC distribution systems and building shell air leakage has been expanded due to the implementation of CHEERS Certification Training for Raters to do "Diagnostic Testing and Verification." Finally, PG&E reports that many promising partnerships are emerging or have been formed (HUD/FHA, Enercomp, Federal banking regulators, USDA, Fannie Mae, Service Institute, redevelopment agencies) as a result of the program that can create momentum for sustainability.

Program Activity Indicators: As of June, 1998, SoCal Gas had provided a pool of $300,000 to fund 1998 CHEERS efforts ($150,000 to subsidize the cost of ratings) and 900 ratings had been done state-wide. As of July, 1998, CHEERS was working with HUD in SCE territory to establish a labeling initiative for Real Estate Owned (REO) properties. Also as of July, in PG&E territory, CHEERS was engaged in ongoing discussions with Fannie Mae, Freddie Mac, and US Department of Agriculture (USDA). REO rating program with the Fresno, Sacramento, and San Francisco HUD offices has been successful enough from HUD's perspective to lead to an extension through 1999. Increasing Energy Efficient Mortgage penetration in homes repossessed, rated, and retrofitted has caused HUD to extend an incentive program for Realtors and Lenders based on the HERS/EEM process. Future statewide expansion of this and analogous programs could cover hundreds of thousands of homes per year.

According to the 3rd-Party provider of the Ease of Mind Home Warranty Program (filed as Peace of Mind Home Warranty), the program launch occurred on July 15, 1998. Closing functions by program-certified contractors commenced July 27, 1998. Thirty CHEERS Ratings had been conducted as at July 31, 1998. A back-log of more than 200 CHEERS Ratings have been scheduled as of July 31, 1998. The entire program infrastructure is fully in place and functioning. Affinity/Enterprise Partner Programs[37] are defined and in preparation for launch. All ten marketing programs will be launched by August 30, 1998.

D. Program Assessment Information

Evaluation of Assumptions: Not available

Support for Market Transformation: If, over the next couple of years, CHEERS can come to rely solely on its rating income, then transformation of the market will have occurred.

Conditions for Altering or Withdrawing Program: The CHEERS Support Program is expected to become financially self-sufficient within three years.

References:

Pacific Gas and Electric Company. *Application of Pacific Gas and Electric Company for Approval of 1998 Energy Efficiency Programs, Shareholder Incentive Mechanism for 1998 Programs, as Cost Accounting Process for Transfer of Surcharge Funds, and Update of Energy Efficiency Commitments*. San Francisco, CA. October 1997.

Pacific Gas & Electric Company. *1998 Customer Energy Efficiency Programs, Advice Filing*

[37] Affinity/Enterprise Partners participating in the Program include the California organized plumbing, heating and cooling industry (1200 contractors and 35,000+ professional contracting personnel), one of California's largest home warranty service companies (Buyers Home Warranty Company), the CHEERS home energy efficiency assessment organization, energy conservation measure (ECMs) device manufacturers, the California real estate industry (The California Association of Realtors), the commercial banking industry (California Bankers Association) and California municipal governments promoting residential energy efficiency.

2086-G/1776-E, Attachments. San Francisco, CA, June 1998.

Pacific Gas & Electric Company. *Second Quarter Program Report*. July 1998.

Pacific Gas and Electric Company. William Miller and Charles Segerstrom. "PG&E Energy Efficiency Program Supplemental Information." San Francisco, CA August 1998.

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The Service Institute. *Ease of Mind Home Warranty Program, SCE Purchase Order #K1038006, CBEE Program Summary*. Los Angeles, CA. August 1998.

Energy Center of Wisconsin. *Developing a Sustainable Home Energy Rating System (HERS) WI Infrastructure.* URL:http://www.ecw.org**.** 1998.

Energy Center of Wisconsin. *HERS Expanded Components* . URL:http://www.ecw.org**.** 1998.

Alliances/Branding/Labeling Program

A. Program[38] Description and Objectives

Program Administrator Area: Residential
Program Budget: PY98 California PGC DSM Budget $5.9 million (Utility and Out-of-State Programs)
Program Reporting Category: Residential Information
Program Commitment: Multi-year
Program Description and Market Transformation Plan: The Alliances/Branding/Labeling Program works to form alliances between trade associations, manufacturers, and retailers and the U.S. Department of Energy/Environmental Protection Agency (DOE/EPA) in order to promote market penetration of products rated with the DOE/EPA Energy Star™ label. Efforts involve media campaigns to advertise retailers selling Energy Star™ equipment, point of purchase marketing materials for retailers, incentives to manufacturers to produce Energy Star torchieres, and promotion of the Energy Star label in conjunction with the EPA. Programs also involve training of residential building designers and builders in selling windows with Energy Star™ or other energy efficiency labels.

The market transformation plan for the Alliances/Branding/Labeling program rests on the idea that instituting simple, unbiased, and reliable labels increases consumer awareness for energy efficient products as well as lowers information search costs and performance uncertainties. It is also thought that advertising Energy Star™ labeled products reduces hassle costs associated with tracking down energy efficient equipment and that educating consumers about the Energy Star™ label will have a lasting effect on purchasing habits. Increasing manufacturing of Energy Star™ products is expected to eventually drive down incremental costs for energy efficient equipment. It is also hoped that gaining retailer participation will have a lasting effect, as retailers gain a vested interest in selling Energy Star™ equipment.
Program Implementers and Affiliates: Utility staff, U.S. Department of Energy/Environmental Protection Agency, National Fenestration Rating Council, trade associations, manufacturers, retailers, vendors, 3rd-Party
Customer/Building Type: residential single family, multi-family, mobile home
Energy End Uses: HVAC, lighting, clothes washing, refrigeration, water heating.
End-Use Technologies, Services, Practices: Compact fluorescent lamps, high performance windows, horizontal-axis clothes washers, high efficiency air conditioners and refrigerators, condensing furnaces.
Customer Geographic Area: National effort with a focus on retailers, distributors, contractors, and customers in California.

B. Market Transformation Characteristics

Market Event(s): renovation/rehab, planned replacement, emergency replacement, retrofit, new construction.
Market Barriers Addressed: Performance uncertainties, information or search costs, asymmetric information or opportunism, bounded rationality, and service or product unavailability.

[38] Note that for 1998 programs, "program" is the *combination* of similar utility-sponsored programs.

Market Barriers Not Addressed: Organizational practices or customs, access to or understanding of financing, misplaced or split incentives, and inseparability of product features.
How is the market changing (if at all)? Energy Star is becoming a highly recognized label as promoted by the Department of Energy.
Other Market Transformation Activities in (or Outside) California: The Northeast Energy Efficiency Partnership (NEEP) *High Efficiency Residential Clothes Washers and Energy Efficient Residential Lighting* programs provides baseline studies and coordinate utility efforts to promote energy-efficient clothes washers and lighting. The NEEA *High-Efficiency Residential Window Products* aims to improve residential heating efficiency (primarily in new single-family homes), and boost consumer demand and market share for windows, doors, skylights and other fenestration products that exceed applicable energy code standards. A secondary target is fenestration products used in residential remodels. Activities include various promotional initiatives (such as advertising and product branding), sales training for manufacturers and technical assistance for builders.
Services Provided to Market Actors:
Alliances/Branding/Labeling Program

	Services Provided to Market Actors							
Market Actor	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Standards, Labeling	Demon-stration	3rd Party Experts	Other:
Home Owner, Property Manager	Yes				Yes			
Designer/Specifier	Yes				Yes			
Contractors	Yes				Yes			
Retailers	Yes				Yes			
Distributors	Yes				Yes			
Manufacturers	Yes			Incentives	Yes			
Lending Agents								
Other								

C. Indicators of Program Performance

Energy or Value Indicators: Projected 1st year savings are 1407 MWh. 15 year "program-weighted" measure lifetime. No cost-effectiveness information is provided. Strong, evidence indicates that the program is cost effective because it targets a large market for cost-effective lighting fixtures and appliances and also leverages national promotional efforts for the EPA Energy Star label.

Market Indicators: No formal study of the market effects of the Alliances/Branding/Labeling program is available, but PG&E reported in July, 1998, that with the exception of Sears, most retailers are using signs and banners on appliances that qualify as Energy Star and discussions with salespeople indicate that many customers are asking for Energy Star qualified appliances.

Similarly, SDG&E reported that many of the participating retailers have begun to incorporate Energy Star training into their training classes. During interviews, sales personnel have indicated that they felt more informed and could better educate consumers on the benefits of owning energy efficient appliances. In follow-up meetings with retailers and their staff, they have indicated to SDG&E, as well as the DOE, that the Energy Star point of purchase materials are helpful aids in communicating the benefits of energy efficient appliances and the Energy Star logo is easily recognizable by consumers. Retailers feel they are better equipped when talking to consumers

who are interested in energy efficient appliances.

Program Activity Indicators: As of July, 1998, Energy Star promotion was occurring in over 200 retail stores in the PG&E service territory. Two bill inserts had been sent to more than 4 million homes. Electric and Gas Industries Association (EGIA) representatives had begun promoting the benefits of incorporating Energy Star in sales presentations. In San Diego, over 65 retailers are participating in the Energy Star Program and over 50 percent of the store personnel have received training on the benefits of adopting energy efficiency and the Energy Star program. Newspaper advertising recognizing participating Energy Star retailers began in February and is scheduled to run twice weekly through the remainder of the year. An Energy Star bill insert was run in the month of April. SDG&E's Website was enhanced to include information on the benefits of owning Energy Star appliances with links to the DOE's web-site. This site will be is expected to be available for viewing in mid-July.

The following Retail Initiatives program activities were reported by SCE in their July, 1998 report to the CPUC:

- Signed ENERGY STAR® license agreement;
- Signed agreement with consultant to perform program management services;
- Distributed the major appliance labeling (MALP) Request for Information (RFI) to potential participants;
- Received and completed the evaluation of MALP RFI reply documents;
- Developed boilerplate major appliance retailer participation agreement;
- Created promotion strategy for the four programs;
- Created MALP baseline study design;
- Commenced MALP Market Effects study plan design;
- Created customer brochure designs for all four initiatives
- Designed and commenced development of retailer sales staff education/training package for four programs; and
- Commenced design of program expense and tracking systems for four programs.

D. Program Assessment Information

Evaluation of Assumptions: Sales of efficient equipment versus standard equipment should be tracked.

Support for Market Transformation: Sales volumes of Energy Star™ equipment would indicate changes in consumer purchasing habits and retail availability and retail promotion of Energy Star™ equipment.

Conditions for Altering or Withdrawing Program: California PCG funding of the program might cease when the Energy Star™ label is recognized by all consumers and retailers, when consumers have internalized the concept of life-cycle savings from the purchase of Energy Star™ equipment, and when Energy Star™ equipment is widely available in retail stores and from contractors.

References:

Pacific Gas & Electric Company. *Application of Pacific Gas and Electric Company for Approval of 1998 Energy Efficiency Program, Shareholder Incentive Mechanism for 1998 Programs, a*

Cost Accounting Process for Transfer of Surcharge Funds, and Update of Energy Efficiency Commitments, San Francisco, CA, 1997.

Pacific Gas & Electric Company. *1998 Customer Energy Efficiency Programs, Advice Filing 2086-G/1776-E, Attachments.* San Francisco, CA. June 1998.

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Northeast Energy Efficiency Partnership. *High Efficiency Residential Clothes Washers Program*. see URL:http://www.neep.org. 1998.

Northeast Energy Efficiency Partnership. *1997 Annual Report: Forming Alliances and Transforming Markets.* Lexington, MA. 1998.

Northwest Energy Efficiency Alliance. *High-Efficiency Residential Window Products Program.* see URL:http://www.nwalliance.org. 1998.

Residential Standard Performance Contract (RSPC)

A. Program[39] Description and Objectives

Program Administrator Area: Residential
Program Budget: PY98 California PGC DSM Budget $19 million (New PY98 Utility Program)
Program Reporting Category: Residential Energy Efficiency Incentives
Program Commitment: Multi-year
Program Description and Market Transformation Plan: The RSPC program was administered in 1998 by four California utilities (PG&E, Edison, SDG&E, and SoCalGas). Both direct install and retail projects are eligible for the program. Direct install projects involve the direct installation of eligible energy-efficiency measures in individual residential dwellings. Retail projects involve the sale of eligible equipment to the residential consumer market.

Incentive prices paid for energy savings varied (depending on the utility). SoCalGas offered $0.20/therm[40] for direct-install measures only based on the lifetime[41] of energy savings. PG&E, Edison, and SDG&E had varying contract prices, but all incentive prices were based on one year of energy savings. Short-life incentive prices for direct-install measures were $0.12-0.18 /kWh and $0.40-0.60/therm for single-family and $0.25/kWh and $0.80/therm for multi-family/mobile homes. Long-life incentive prices direct-install measures were $0.35-0.48/kWh and $0.80/therm for single-family and $0.36-0.48/kWh and $1.00/therm for multi-family/mobile homes. Retail projects for PG&E, Edison, and SDG&E had incentive prices ranging from $0.11-0.48/kWh.[42] Other limitations were established such as a maximum single contract incentive (30% of total program budget) and minimum project size of 200,000 kWh or 20,000 therms. To date, all project sponsors have opted to contract for a "deemed" payment method (based on utility-prescribed energy savings, measure lifetimes, and retention study results) rather than the performance based M&V payment method.

Projects have a one-year performance period. Project sponsors receive no incentive payment until the energy-efficient equipment is installed (or stocked—in the case of residential retail projects). Upon verification of equipment installation and proper operation Project Sponsors receive 40-75% of the total incentive. Payment for the remaining 25-60% of the incentive is made once the entire project has been completed (or in the case of performance-based payment once savings have been measured and verified after the performance period). Project Sponsors are required to submit an installation deposit prior to installing energy efficiency measures. The deposits are refunded only if the project sponsor achieves 90% of its contracted incentive amount (PG&E, SCE, SoCalGas) or 95% of its committed energy savings (SDG&E).

The RSPC market transformation plan aims to develop greater customer knowledge of energy efficiency services, build better relationships between EESPs and customers, and create more sophisticated EESP marketing and business practices. By encouraging involvement of retailers, contractors, and EESPs in the RSPC program, these players will gain crucial experience

[39] Note that for 1998 programs, "program" is the *combination* of similar utility-sponsored programs.
[40] SoCalGas also offered $0.10/therm for direct-install water heater controllers based on 15 years of energy savings.
[41] Lifetimes varied from 8 years for refrigerator turn-in and lighting controls to 25 years for attic insulation.
[42] PG&E offered retail incentives of $0.11/kWh for all technologies and $0.40/therm for horizontal axis clothes washers. Edison only offered retail incentives of $0.11/kWh for CFLs. SDG&E only offered retail incentives of $0.11/kWh for CFLs and $0.36-0.48/kWh for refrigerators.

and skills in the energy efficiency industry that will enable them to continue offering energy efficiency products and services to residential customers in the absence of the program. The ultimate goal is to build a fully competitive, robust, and self-sustaining market for retailers, contractors, and EESPs to deliver energy efficiency products and services.
Program Implementers and Affiliates: utility staff, ESCOs, vendors, retailers, and distributors
Customer/Building Type: Residential single family, multifamily, and mobile home
Energy End Uses: HVAC, lighting, water heating, refrigeration, motors, and miscellaneous
End-Use Technologies, Services, Practices: Eligible short-life measures include: compact fluorescent lamps, low-flow showerheads, faucet aerators, water heater blankets, controls, infiltration reduction, and refrigerator turn-in.
Eligible long-life measures include: insulation (ceiling and wall), energy-efficient windows, energy-efficient equipment (gas furnaces, central air conditioners, central heat pump, gas water heaters, heat pump water heaters), programmable thermostats, duct sealing, duct insulation, energy-efficient appliances (refrigerators, horizontal-axis clothes washers), energy-efficient lighting fixtures (hard-wired), pool pump, and hot water pipe insulation.
Customer Geographic Area: All CEC climate zones

B. Market Transformation Characteristics

Market Event(s): Primary: retrofit, planned replacement, renovation (w/o Title 24)/; secondary: emergency replacement
Market Barriers Addressed: Low levels of activity between private energy service companies and customers (*organizational practices or customs, service or product unavailability*). Lack of customer knowledge about energy efficiency performance contract projects (*information or search costs*). Lack of access to funding in bidding programs by non-selected Energy Service Companies (ESCOs) and contractors (*access to financing*). Non-traditional participants such as customers, contractors and engineering firms do not take part in pay-for-performance energy efficiency programs (*organization practices*). Marketing and educational efforts attempted to alter customer's negative perceptions of performance contracting (*performance uncertainty*) and to highlight the benefits (*tailored applications, local control*).
Market Barriers Not Addressed: Hassle or transaction costs, asymmetric information or opportunism, bounded rationality, misplaced or split incentives, inseparability of product features
How is the market changing (if at all)? No information is available to suggest market is changing at this time.
Other Market Transformation Activities In or Outside California: Residential Pilot DSM Bidding Program implemented by Edison and SoCalGas in 1995-96. There are also ReSPC type programs in Wisconsin, Massachusetts, and New Jersey.

Services Provided to Market Actors:
Residential Standard Performance Contract Program

Market Actor	Services Provided to Market Actors							
	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Standards, Labeling	Demon-stration	3rd-Party Experts	Other: ECMs
Home Owner, Property Manager, Consumer								Yes
Designer/Specifier								
Contractors	Yes	Yes		Incentives				Provide
Retailers	Yes			Incentives				Provide
Distributors								
Manufacturers	Yes							
Lending Agents								
Other: ESCOs, EESPs				Incentives				Provide

C. Indicators of Program Performance

Energy or Value Indicators: Deemed savings estimates[43] are 66 GWh and 2,458,000 therms; 10 year "program-weighted" measure lifetime. TRC tests were available for three out of four programs within this program group. Cost effectiveness as suggested by these TRC tests ranges from 1.21 (PG&E), 1.38 (SDG&E), to 1.55 (SCE). The program-budget-weighted average TRC is 1.37.

Market Indicators: No evidence is available at this time on market indicators. CBEE has commissioned a market effects study of the RSPC program. However, PG&E reported an "overwhelming" interest in the program by the Energy Efficiency Service Provider (EESP) community in their 2nd Quarter Report to the CPUC.

Program Activity Indicators: Each utility received about 20 applications from large ESCOs. About three-fourths of the ESCOs requested the maximum allowable incentive payment of $1.2 million ($810,000 for SDG&E). The utilities received only a few applications of less than $100,000 from local residential insulation, window and HVAC contractors for mostly long-life measures. Each utility received one or more retail project applications. Due to the large number of applications submitted, selection of projects was based on a lottery rather than on economic or cost-effectiveness considerations, marketing plans, end uses, quality of measures, customer contribution, or services offered.

As of July, 1998, PG&E reported that three contracts would be executed shortly. On one contract, negotiations are underway to resolve the final installation and verification protocol for a measure not included in the ReSPC Deemed Savings Measure List. Two other contracts had been sent to the contractors for signature. SoCal Gas reported that they had developed verification protocols and reached agreement reached with two of the first three contractors. Discussions had begun with the three firms targeted to receive funding from the proposed budget increase. SDG&E reported that one EESP contract had been signed by both the project sponsor and the utility for direct installation of lighting measures and showerheads in multi-family and master-metered dwellings. SDG&E planned to issue an additional three contracts within the next 30 days. SCE reported that none of the four pending SPC contracts had been signed, but were

[43] Deemed savings estimates are based on utility-sponsored RSPC studies or utility-sponsored M&E studies or both.

anticipating doing so by the end of the month.

D. Program Assessment Information

Evaluation of Assumptions: Goldman, et al, provide a discussion of important issues relative to evaluating Nonresidential SPC programs that are also relevant for the RSPC program. The following paragraph is from Goldman, et al. Assessing the vibrancy of California's private-sector energy-efficiency industry is complicated by ambiguity about what exactly is the market that an SPC-type program seeks to transform. The evaluation should address three broad issues: (1) the program's impact on the market for performance contracting, (2) the program's impact on the growth and expansion of the EESP industry, and (3) the program's impact on reducing customer market barriers to pursuing cost-effective energy-efficiency investments in the residential sector. The focus of the evaluation may depend to some extent on one's definition of the market and market barriers being addressed by an SPC-type program. These underlying assumptions cannot be fully evaluated at this time.

Support for Market Transformation: According to Rubenstein, et al, one way to assess whether activities conducted through the SPC programs will continue in the absence of SPC funding is customers' willingness to contribute to the cost of energy-efficiency measures. However, the majority of direct-install residential applications include only short-life measures, and since these are relatively inexpensive, the Project Sponsors are *not* requesting customer contributions. The RSPC programs therefore seem unlikely to establish long-term customer relationships or influence customers to purchase energy-efficiency equipment once the programs cease to exist.

Other measures of the "success" of an SPC-type program might include: (1) successful entry by EESPs, (2) market share for retail suppliers offering energy-efficiency services compared to those that focus on "commodity-only" supply, and (3) penetration rates in various market segments for energy-efficiency "value-added" services and providers.

Conditions for Altering or Withdrawing Program: According to Rubenstein, et al, project sponsors responded noticeably to pricing signals. The majority of projects selected through the lottery targeted multifamily and mobile home dwellings, for which a greater incentive is offered. Given the marked response to the incentives, it may be possible to reduce incentives in all customer segments and end use categories in the future without triggering a significant decline in participation. This will encourage growth of the market and reduce dependency on publicly funded subsidies.

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"Downstream" Appliance Incentive Program

A. Program[44] Description and Objectives

Program Administrator Area: Residential Retrofit
Program Budget: PY98 California PGC DSM Budget $3.7 million. Budget information for SDG&E's 3rd-Party program was not provided. This program category includes existing utility programs.
Program Reporting Category: Residential Appliance Efficiency Incentives
Program Commitment: Single year
Program Description and Market Transformation Plan: The "Downstream" Appliance Incentive (DAI) program includes two programs administered in 1998 by two California utilities (PG&E and Edison) and one California 3rd-party program (in the SDG&E service area). The DAI Program provides cash incentives in the form of rebates, vouchers, or discounts to customers purchasing high-efficiency refrigerators and horizontal-axis clothes washers. Other appliances, such as dishwashers, could also be included. The program provides market materials and training for appliance retailers and educational materials for customers to promote understanding of the advantages of energy-efficient appliances. The DAI Program works in cooperation with the Energy Star labeling program, the Consortium for Energy Efficiency (CEE), and water districts throughout the state. The program's objective is to reduce the initial cost of purchasing efficient clothes washers and refrigerators.

The market transformation plan is to educate customers and retailers about the advantages of high-efficiency refrigerators and horizontal-axis clothes washers and reduce their initial purchase cost. This will stimulate demand for such products, first leading to greater stocking and floor space devoted to them by retailers. Since performance standards for receiving purchase incentives are consistent throughout the state (and nation), manufacturers will eventually respond by increasing production of energy-efficient models. This will further reduce costs. Ultimately, manufacturers will produce such products at a price that can be supported by educated retail consumers without subsidies and/or to comply with rigorous new federal (NAECA) minimum efficiency standards.
Program Implementers and Affiliates: Utility staff, vendors, contractors, local governments, EPA, CEE
Customer/Building Type: Customer: residential, small commercial Building Type: single family, multi-family, and (in San Diego County only) small commercial (laundromats)
End Use Technologies, Services, Practices: Horizontal-axis clothes washers, high-efficiency refrigerators
Customer Geographic Area: All CEC climate zones

B. Market Transformation Characteristics

Market Event: Equipment purchase
Market Barriers Addressed: Performance uncertainties, information or search costs, asymmetric information or opportunism, bounded rationality, misplaced or split incentives, inseparability of product features, product unavailability, irreversibility
Market Barriers Not Addressed: Organizational practices or customs, hassle or transaction

[44] Note that for 1998 programs, "program" is the *combination* of similar utility-sponsored programs.

costs, access to or understanding of financing
How is the market changing (if at all)? Not available
Other Market Transformation Activities In or Outside of California: The US EPA Energy Star**,** Clothes Washer Labeling Program and Super-Efficient Refrigerator Program (SERP) are national alliance/branding/labeling programs. The Consortium for Energy Efficiency (CEE) *Clothes Washer Standards Program* works with gas, water, and electric utility partners representing nearly 18 percent of the nation's residential customers to encourage wider U.S. availability and sustained consumer demand for a new generation of efficient clothes washers. These washers use up to 50 percent less energy and up to 30 percent less water than standard models. In addition to saving resources and money, some manufacturers claim that washers meeting CEE's efficiency specifications get clothes cleaner, rinse more thoroughly and treat clothes more gently. The CEE *Super-Efficient Household Appliance Standards Initiative* promotes the purchase and use of super-efficient home appliances by educating consumers about the economical and environmental benefits of these products. The initiative offers common specifications for retail super-efficient refrigerators, dishwashers, and room air conditioners. It also promotes an identity for super-efficient appliances by supporting the use of the DOE/EPA ENERGY STAR logo as the universal identifier of energy-efficient products meeting high-efficiency standards. The Northwest Energy Efficiency Alliance (NEEA) *WashWise (Resource-Efficient Clothes Washers) Program* promotes resource-efficient clothes washers--and their substantial energy, water and detergent savings--through financial incentives to buyers ($70 apiece) and dealers ($10 apiece) of qualifying machines. A region-wide consumer education campaign is also part of this venture's strategy. WashWise aims to increase the current tiny market share of resource-efficient washers--also known as horizontal-axis or tumble-action washing machines--and ultimately to influence federal energy efficiency standards for clothes washers. The NEEA *National Standards* project funds participation by Oregon Office of Energy staff in three national forums that are instrumental in setting national energy efficiency standards: the U.S. Department of Energy committee on appliance efficiency standards; the National Fenestration Rating Council technical steering committee; and the ASHRAE/IESNA 90.1 commercial building codes lighting subcommittee.

Services Provided to Market Actors:
"Downstream" Appliance Incentive Program

	Services Provided to Market Actors							
Market Actor	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Standards, Labeling	Demon-stration	3rd-Party Experts	Other:
Home Owner, Property Manager				Rebates, Vouchers				
Designer/Specifier								
Contractors								
Retailers	Yes				Yes			
Distributors								
Manufacturers	Yes				Yes			
Lending Agents								
Other: Local Government (water districts)	Yes				Yes			

C. Indicators of Program Performance

Energy or Value Indicators: Projected 1st year energy savings are 2.6 GWh and 326,000 therms based on past program experience and M&E load impact studies. 15-year "program-weighted measure lifetime. TRC tests were available for two of the three programs within this program group. Cost effectiveness as suggested by these TRC tests ranges from 1.05 (SCE Direct Rebate Program) to 1.27 (PG&E Super Cool Super Clean Program). The program-budget-weighted average TRC is 1.22.

Market Indicators: Investigation of PG&E's Efficient Refrigerator Rebate Program and SDG&E's High-Efficiency Refrigerator Program by Eto, et al in 1996 found some evidence for temporary market effects and limited evidence for lasting market effects brought about by these programs. For example, they reported the results of an SDG&E study which found the average floor stock efficiency rating increased from 7% above the federal standards in 1990 to 15.5% above the standards in 1992. Eto and his colleagues reported that customer demand for efficient refrigerators had increased due to incentive and promotion within the programs and that customers seem to have an increased willingness to pay for energy efficiency - demonstrated by continued strong participation in the programs even when incentives were reduced.

Data collected in a 1998 market effects study of SDG&E and PG&E refrigerator programs (Hagler Bailly Consulting, Inc. 1998) suggested that these programs have successfully created some significant changes in the market for energy-efficient refrigerators in their territories. The study found little evidence to predict whether these effects will prove to be lasting; however, through helping demonstrate the technology and market acceptance, and through the efforts of individual utility staff, the California refrigerator programs had an effect on the federal refrigerator efficiency standards and the 1990 California standards.

Less formal market indicators are provided by PG&E in their July, 1998 report to the CPUC. The utility has found that since the program began, stores that carried one washer product from one manufacturer have now chosen to carry products from two different manufacturers. One manufacturer has introduced new products that are even more efficient than their current horizontal-axis washers, and one manufacturer has also included their own rebate in addition to rebates offered by PG&E and the water utility partners. PG&E also reports that salespeople have seen their sales go from one efficient washer out of 25 to 1 out of 10 and that increased customer

demand has led to manufacturer planning for increased production.

Program Activity Indicators: The SDG&E Third Party Energy-Efficient Apartment-Sized Refrigerator Sales program (also called Energy-Efficient Refrigerators) was implemented in May and has a goal of selling and installing 10,000 units. The SDG&E Third Party Coin-Operated, Horizontal Axis Clothes Washers program will begin providing incentives in July toward the purchase of 625 washers.

As of June, 1998, the SCE Residential Appliance Direct Rebate program tracking database had been established to record customer reservations, generate checks, and provide inspection worksheets to be used in verifying customer purchases in a random sample. Eligible refrigerator brochures were printed and distributed to major appliance dealers. While participation had been less than anticipated, reservations doubled each week in June and distributors were requesting program information and marketing the availability of high efficiency units and rebates.

As of July, 1998, PG&E reported the following program activities for its Super Cool Super Clean program, which promotes both efficient refrigerators and washing machines. The Refrigerator program element has very little rebate qualifying product available. The major manufacturer who produced qualified products decided to discontinue the product. The Clothes Washing Machine program element has implemented an integrated marketing and incentive program with interested regional water agencies. Early indications for qualified washer sales are approximately 400% ahead of last year's pace. Five water utilities have joined the program, offering rebates of $50-$75. Two additional water utilities may join. Over 200 retailers are participating.

D. Program Assessment Information

Evaluation of Assumptions: Not available

Support for Market Transformation: Short-term effects might be measured by tracking consumer awareness of energy-efficient appliance choices and promotion, stocking, and display patterns of participating vendors. In the longer term, effects might be measured by tracking market share of efficient products, new product features, and incremental cost of energy-efficient appliances. Methods program administrators might use to gather this information include customer intercept surveys at participating and non-participating retail locations, participant mail/telephone surveys, saturation surveys, and examining retailer sales records.

Conditions for Altering or Withdrawing Program: The clothes washer element of the program will require continued market intervention activities to reach full market commercialization level (on the order of 20% market share) or until a rigorous new federal standard is developed. The refrigerator element of the program is designed to serve as a "bridge" activity in 1998 to support the market for super-efficient refrigerators until regionally and nationally coordinated performance specifications are developed in 1999. Follow-on activities will be required to build enough consumer demand and manufacturing experience to support subsequent iterations of the federal appliance standard for refrigerators. PCG support for both program elements could be terminated when California consumers know which energy-efficient product to buy, and why, based on a combination of increased customer and retailer education and enhanced availability of options. Key measures to assess when this has occurred will include customer awareness, energy-efficient appliance market share, and retail floor space devoted to efficient appliances.

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Residential "Upstream" Incentives Program

A. Program[45] Description and Objectives

Program Administrator Area: Residential
Program Budget: PY98 California PGC DSM Budget $5.4 million (Existing Utility Program)
Program Reporting Category: Residential Energy Management Services
Program Commitment: Multi-year
Program Description and Market Transformation Plan: The Residential "Upstream" Incentives program had two elements; one focused on lighting fixtures, the other on horizontal-axis clothes washers. The lighting fixtures element seeks to expand the market for high-quality residential compact fluorescent lighting (CFL) and lower the cost of the energy-efficient bulbs with a rebate to participating manufacturers. Efforts by California utilities (SDG&E and PG&E) are coordinated with the Northwest Energy Efficiency Alliance's (NEEA) LightWise program in order to work consistently with manufacturers to ramp up production and to leverage purchasing power of compact fluorescent (CF) light bulbs. The clothes washer element of the program is designed to promote the purchase of horizontal-axis clothes washers by providing monetary incentives to retailers to increase availability of this technology. Both elements of the "Upstream" Incentives Program also involve efforts to promote the program's products to retailers, providing point-of-purchase customer education materials to attract customers to the products and inform them of product benefits.

The market transformation plan for the lighting fixtures element of the "Upstream" Incentives Program is as follows: Using manufacturer incentive payments to temporarily decrease the price of CFLs is expected to increase consumer acceptance of CFL technology and increase availability of CFL products, because reduced prices will encourage retailers to stock such products. It is hoped the increased cumulative demand of retailers will spur higher levels of manufacturer production, leading to lower marginal costs. As costs decrease, retailers stock CFL products consistently, salespeople become educated about ways to convey the benefits of CFLs, and consumers become more aware of their life-cycle benefits, incentive payments could be reduced and ultimately eliminated as the market is fully transformed.

The market transformation plan for the clothes washers element of the "Upstream" Incentives Program is to educate customers and retailers about the advantages of horizontal-axis clothes washers. In combination with retailer incentives and sales training, this is expected to lead to greater stocking and floor space devoted to them. Since performance standards for receiving purchase incentives are consistent throughout the state (and nation) manufacturers are expected to eventually respond by increasing production of energy-efficient models. This will further reduce costs. Ultimately, manufacturers will produce such products at a price that can be supported by educated retailers without subsidies and/or to comply with rigorous new federal (NAECA) minimum efficiency standards.

Program Implementers and Affiliates: Utility staff, consultants, NEEA, EPA Energy Star, distributors, retailers, San Diego Water Authority, San Diego Metropolitan Water District.
Customer/Building Type: Residential, small commercial.
Energy End Uses: Indoor lighting, outdoor lighting, clothes washing
End-Use Technologies, Services, Practices: Indoor hardwired lighting fixtures, outdoor

[45] Note that for 1998 programs, "program" is the *combination* of similar utility-sponsored programs.

hardwired lighting fixtures, CF torchieres, and compact fluorescent light bulbs, horizontal-axis clothes washers.
Customer Geographic Area: San Diego area (SDG&E territory), Northern California (PG&E territory), the Northwest region, particularly Washington and Oregon, also Montana and Idaho.

B. Market Transformation Characteristics

Market Event(s): Emergency replacement, retrofit
Market Barriers Addressed: organizational practices or customs, performance uncertainties, information or search costs, hassle or transaction costs, service or product unavailability.
Market Barriers Not Addressed: bounded rationality, access to or understanding of financing.
How is the market changing (if at all)? Not available.
Other Market Transformation Activities In (or Outside) California: The Northwest Energy Efficiency Alliance (NEEA) sponsors the *LightWise* program which coordinates customer education and manufacturer rebates for compact fluorescent lighting with a 2.5-year budget of $2.5 million. LightWise provides upstream incentives of $5-per-bulb to participating manufacturers of CFLs to lower retail costs, increase availability and expand consumer awareness and acceptance. The Consortium for Energy Efficiency (CEE) *Residential and Small Commercial Lighting Manufacturer Incentives Program* aims to stimulate the market for high-quality, screw-based compact fluorescent lamps (CFLs). Please see "Downstream" Appliance Incentives Program summary for a description of other market transformation activities for high efficiency clothes washers.
Services Provided to Market Actors:
Residential "Upstream" Incentives Program

	Services Provided to Market Actors							
Market Actor	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Standards, Labeling	Demon-stration	3rd-Party Experts	Other:
Home Owner, Property Manager	Yes							
Designer/Specifier								
Contractors								
Retailers	Yes			Incentives	Yes			
Distributors	Yes				Yes			
Manufacturers				Incentives				
Lending Agents								
Other:								

C. Indicators of Program Performance

Energy or Value Indicators: first-year energy savings: 31 GWh (utility estimate based on prior M&E studies); "program-weighted" measure lifetime 10 years. [46] The NEEA program reports 134,156 LightWise bulbs were shipped to retailers during the program's first year by two participating manufacturers for a life cycle energy savings of approximately 67 MWh, or an annual savings of approximately 10 MWh. TRC tests were available for all three programs within this program group. Cost effectiveness as suggested by these TRC tests ranges from range from 0.26 for SDG&E's Horizontal Axis Clothes Washer program to 1.06 for SDG&E Residential Fixture Program to 4.86 for PG&E's Energy Efficient Lighting Fixtures Program. The program-budget-

[46] Elements of PPT will be explicitly represented for PY 99 programs.

weighted average TRC is 2.81.

Market Indicators: A market effects study of SDG&E and PG&E residential compact fluorescent lighting programs (RER, 1998) concluded that California utility programs have had some significant impacts on the market for CFLs in California but evidence is sparse that these impacts would persist in the absence of continued involvement. The study states:

> In only two cases can a case be made that the market effects are permanent. First, California utility programs, by specifying performance criteria, have probably helped improve the quality of CFLs available. Second, by helping to increase demand, we [the study authors] expect that utility programs have contributed to some decline in the price of CFLs as manufacturers have improved their production processes and gained benefits from economies of scale (although this study did not measure changes in CFL prices. (RER 1998, pp. 1-9 and 1-10)

Program Activity Indicators: As of July 1, 1998, PG&E had selected three manufacturers to participate through competitive bid. Stretch goal is 150,000 units: as of July 1, 1998 at 15% of goal. SDG&E's products began to be shipped to retailers April 27, 1998 and as of June, 1998, three ads focusing on the benefits of these energy efficient products and what the Energy Star™ label means to consumers were developed and scheduled to run in three local newspapers in early June. A bill insert is scheduled for July customer bills. Products from two of the three manufacturers participating in the program are expected to become available to retailers in mid to late second quarter. NEEA has enlisted the participation of four light bulb manufacturers and a distributor to encourage retail participation areas of lower population density. LightWise aims to distribute 500,000 CF light bulbs from mid-1997 through 1999.

As of June, 1998, SDG&E's Residential Horizontal Axis Clothes Washers program had 57 participating retailers and provided incentives for the purchase of over 1,500 units as of mid-May, 1998. Due to an overwhelming response rate (384% above expected) from Maytag marketing efforts, the utility was able to use funds originally slated for promotional efforts to provide incentives for the additional washers. Program funding was exhausted despite lower start-up costs, adding $60,000 to the program budget, and decreasing the incentive level from $200 to $100 in April. The program was closed to additional washer sales effective May 19, 1998.

D. Program Assessment Information

Evaluation of Assumptions: Not available

Support for Market Transformation: Using the California Energy Commission's Lighting Efficiency Technology Report and PG&E's Lighting Fixture Research Project to establish baselines, the following items could be tracked to indicate market effects: number of retailers carrying qualifying products; number and diversity of qualifying fixtures; market share of qualifying fixtures; stocking practice changes; incremental costs; and customer product knowledge, perception, and preference.

Conditions for Altering or Withdrawing Program: Once the EPA Energy Star label becomes used and recognized widely on energy-efficient lighting fixtures, utility or PCG-funded market intervention could be reduced. Once regional and national initiatives have proven that retailers and manufacturers can profit by selling energy-efficient fixtures and appliances, it is believed they will produce and market them without intervention.

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Spare Refrigerator Recycling Program

A. Program[47] Description and Objectives

Program Administrator Area: Residential Retrofit
Program Budget: PY98 California PGC DSM Budget $7.4 million (Existing Utility Program)
Program Reporting Category: Residential Appliance Incentives, Other
Program Commitment: Single year
Program Description and Market Transformation Plan: The Spare Refrigerator Recycling (SRR) Program provides a small incentive (in the form of a check, savings bond, or ice chest) to customers who dispose of operable spare refrigerators in an environmentally responsible, energy saving process. The program uses a turnkey recycling company to implement and maintain the pickup and disposal procedures. The vendor is responsible for establishing and operating recycling centers, scheduling and performing pickups, and for the actual recycling process, which involves dismantling the appliance and removing refrigerants in an environmentally safe manner. The program recovers and recycles CFC HCFC refrigerants, along with non-CFC replacement refrigerants under section 608 of the 1990 amendments to the Clean Air Act. Program guidelines require that the: (1) participant be an residential customer; (2) spare appliance must be working, in conjunction with the corresponding primary refrigerator or freezer, during the six months preceding pickup; and (3) appliance volume must be between 10 and 25 cubic feet.

The market transformation plan aims to remove and recycle approximately 300,000 to 500,000 inefficient, operable old CFC refrigerators from the pool of used refrigerators in California.

Program Implementers and Affiliates: Contractor, utility staff
Customer/Building Type: All residential
Energy End Uses: Refrigeration
End-Use Technologies, Services, Practices: Recycling old (but operable) refrigerators
Customer Geographic Area: Only available in SCE service territory

B. Market Transformation Characteristics

Market Event: Discarding an extra appliance (NOT purchasing a new one to replace it)
Market Barriers Addressed: Hassle or transaction costs, bounded rationality, service or product unavailability, externalities
Market Barriers Not Addressed: Organizational practices, information or search costs, misplaced or split incentives
How is the market changing (if at all)? A 1997 Xenergy/PCS study reported that, absent the program, 51% of the refrigerators recycled would have been retained and used by their owners and 41% transferred into the secondary market of inefficient appliances rather than destroyed.
Other Market Transformation Activities In or Outside California: None identified

[47] Note that for 1998 programs, "program" is the *combination* of similar utility-sponsored programs.

Services Provided to Market Actors:
Spare Refrigerator Recycling Program

Market Actor	Services Provided to Market Actors							
	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Standards, Labeling	Demon-stration	3rd-Party Experts	Other: Appli-ance Disposal
Home Owner, Property Manager				Incentives				
Designer/Specifier								
Contractors	Yes		Customer Contacts					Provide
Retailers								
Distributors								
Manufacturers								
Lending Agents								
Other:								

C. Indicators of Program Performance

Energy or Value Indicators: Projected 1st year annual savings are 34.7 GWh (based on utility M&E studies). This value is extremely high for a residential program and accounts for a significant portion of the total projected savings for programs in this administrator area. 10 year program-weighted measure lifetime. The estimated TRC is 1.7.

Market Indicators: The Xenergy/PCS study found that used appliance dealers do not view the current program as impacting their highly profitable market, in which 100% profits are the rule. The same study also determined that unsubsidized recycling of operable or easily repairable refrigerators seems an unlikely outcome when the market for scrap steel yields about $2.00 per refrigerator and CFC removal and disposal is even less profitable.

Program Activity Indicators: Between 30,000 and 50,000 units have been recycled annually through this program since November, 1993. Between January and the end of May, 1998, approximately 11,000 appliances were recycled.

D. Program Assessment Information

Evaluation of Assumptions: Not available

Support for Market Transformation: The current administrator suggests the following methods for determining program success at market transformation:

1) Probability-based surveys of customers determining that, relative to 1990 and 1995 Residential Appliance Saturation Survey results, significantly fewer customers are spare appliance owners, customers are discarding refrigerators at a significantly lesser age, customers are significantly less likely to purchase a used refrigerator, and the share of purchases which are used appliances has diminished significantly (33%).

2) Survey evidence indicating that more than 50% of operable second appliances, when discarded, are released to recyclers, and that more than half of the recycled appliances are being processed by competitors to the current third-party vendor.

Conditions for Altering or Withdrawing Program: The program would need to operate at current levels for at least five more years to exhaust the potential market of 300,000 to 500,000 customers with spare refrigerators. The program subsidy could be reduced or eventually withdrawn when and the 300,000 to 500,000 old inefficient CFC refrigerators are removed and

recycled from the used refrigerator market.

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Energy Efficiency Mortgages and Loans Program

A. Program[48] Description and Objectives

Program Administrator Area: Residential Retrofit
Program Budget: PY98 California PGC DSM Budget $3.0 million (Existing Utility Program).
Program Reporting Category: Residential Other
Program Commitment: Single year
Program Description and Market Transformation Plan: The Energy Efficiency Mortgages and Loans Program includes an information campaign to educate consumers on the benefits of energy-efficient technologies through residential information and education programs and survey programs. The program introduces consumers to lenders that provide various financing opportunities, educates contractors about energy-efficient equipment and proper installation practices, and educates real estate agents, mortgage lenders, and HUD representatives about energy-efficiency mortgages (EEMs) available from FHA

The Energy Efficiency Mortgages and Loans Program combines three programs offered in California in 1998. These programs offer two distinct forms of financing: 1) below market rate loans for energy-efficient home improvements occurring at any time, and 2) energy efficiency mortgages (EEMs) for energy efficient home improvements occurring when a home is purchased.

Below market rate loans are currently offered through PG&E's Comfort Link and SCE's Residential Financing programs. Both utilities market the program to consumers and help the lenders set up the program. SCE's program also buys down the loan rate. Customers can get loans ranging from $1,000 to $15,000 with a fixed interest rate to install energy-efficient equipment in their homes. The size of the loans falls between residential rebate programs (which are generally for items less than $1,000) and loans offered by CHEERS or Countrywide (which focus on loans greater than $4,000). Financing is available to qualified homeowners for installing insulation, central air conditioning, central heat pumps, and windows that exceed minimum state energy efficiency standards by a pre-determined amount or percentage.

EAHAP differs from the other two programs grouped within the residential financing "umbrella" in that it offers energy efficient mortgages for home purchasers. The program is unique in that it targets this critical intervention point, the home sale, when people are more willing to make home improvements. Including the cost of energy efficiency improvements into the mortgage is effective because when people buy new homes, they usually have limited capital available, but want to make improvements and repairs to their new homes. Significant energy efficiency upgrades can be financed through a 30-year mortgage for additional monthly payments of $20-$40 per month.

Like the other programs, the goal of EAHAP is to entice homeowners to make energy efficiency improvements to homes through low-cost financing. It does this through: 1) a financing product and; 2) through educating real estate agents, mortgage lenders, contractors and consumers. EAHAP is also unique in other ways. It is the only residential financing program that combines the efforts of the federal government, the public sector, the private sector and non-profit organizations. EAHAP is also the only residential financing program that targets first-time and low-income home buyers. . The program disseminates information to the home-buying public through a training module and materials for real estate agents, mortgage lenders and prospective

[48] Note that for 1998 programs, "program" is the *combination* of similar utility-sponsored programs.

home buyers, and a Website. EAHAP also links home buyers with HERS raters and contractors by labeling HUD Homes with an actual HERS rating number and by providing literature that lists raters, facilitators and resources for FHA lenders.

The Energy Efficiency Mortgages and Loans Program is intended to transform the market for home improvement loans to support low-interest financing for energy-efficiency improvements. Currently, such loans are only available (through CHEERS and Countrywide Funding Corporation) for amounts between $4,000 and $8,000. By allowing lenders and customers to finance the purchase and installation of energy-efficient equipment, customers will find that the purchase of energy-efficient equipment is more attractive than standard equipment. The market will reflect this trend with increased sales of energy-efficient equipment and installations. Lenders will be more willing to cover the cost of energy-efficient equipment than before.

Program Implementers and Affiliates: Selected lender, mortgage lenders, utility staff, contractors, Fannie Mae, Electric & Gas Industries Association, Window Manufacturers, American Architectural Association, Consortium for Energy Efficiency, Energy Star, and HUD/FHA

Customer/Building Type: Residential single family, multifamily, and mobile home

Energy End Uses: All, with emphasis on HVAC

End-Use Technologies, Services, Practices: All, with emphasis on insulation, efficient central air conditioning and heat pumps, high-performance windows

Customer Geographic Area: All, but focus on Inland, Desert, and Mountain climate zones

B. Market Transformation Characteristics

Market Event(s): Primary: renovation/rehab (in which Title-24 is invoked) renovation (w/o Title 24), planned replacement, retrofit. Secondary: new construction

Market Barriers Addressed: Performance uncertainties, information or search costs, hassle or transaction costs, access to or understanding of financing, and service or product unavailability

Market Barriers Not Addressed: Organizational practices, asymmetric information or opportunism, bounded rationality, misplaced or split incentives, inseparability of product features

How is the market changing (if at all)? Existing residential financing programs have established contractor organizations that now primarily depend upon this process for their business. Where a sale is made which does not precisely fit the Program, alternate financing is found.

Other Market Transformation Activities in (or Outside) California: Residential energy efficiency financing programs are fairly common throughout the United States.

Services Provided to Market Actors:

Energy Efficiency Mortgages and Loans Program

	Services Provided to Market Actors							
Market Actor	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Standards, Labeling	Demon-stration	3rd-Party Experts	Other
Home Owner, Property Manager	Yes		Links to HERS contractors	Subsi-dized loans				
Designer/Specifier								
Contractors		Yes						
Retailers								
Distributors								
Manufacturers								
Lending Agents		Yes	Customer Contacts	Provide				
Other: Real Estate Agents, HUD Representatives		Yes	Customer Contacts		Yes			

C. Indicators of Program Performance

Energy or Value Indicators: Projected 1st year energy savings are 3.1 GWh and 2,700,000 therms (based on past M&E studies); 15 year program-weighted measure lifetime. TRC tests were available for two out of three programs within this program group. Cost effectiveness as suggested by these TRC tests ranges from 0.99 (PG&E's PY 1997 Home Energy Savings Loan Program the precursor to Comfort Link[49]) to 1.01 (SCE Residential Financing). The program budget weighted average TRC is 1.00.

Market Indicators: Formal studies of market indicators for the Energy Efficiency Mortgages and Loans Program are not available, but PG&E stated in its July, 1998 report to the CPUC that several organizations have formulated and implemented financing programs patterned after the utility's pilot Home Energy Savings Loan (HESL) Program. In response to existing programs, the Insulation Contractors Association and others have developed their own financing options that are used where, for some reason, the work does not qualify for the utility program. They provide unsecured financing at slightly higher rates, but slightly lower than otherwise on the market by our assurance to the lender of quality work (Burt 1998).

According to information provided by the 3rd-Party provider of the Energy Aware Housing Agent Program (EAHAP). HUD Fresno has a goal of closing 270 energy efficiency mortgages during the fiscal year ending October 1, 1998. Not only had that goal been achieved by late July, but 25 percent of the total had been closed on in June. Likewise, HUD's San Francisco jurisdiction closed on as many EEMs in June as it had during the previous four months. The HUD Sacramento jurisdiction achieved 30 percent of its year-to-date total of EEMs during the single month of June. The similar experiences of all three offices indicate that in one month after the

[49] The PG&E October 1997 Application Filing reported a TRC of 0.51 for the Comfort Link Program. However, this included substantial program redesign start up costs along with lower projected participation in the first year. PG&E believes that these costs will not be incurred in subsequent years. Therefore, PG&E provided a TRC of 0.99 based on the Home Energy Savings Loan Program from PY 1997.

implementation of EAHAP's consumer-oriented activities, home buyer interest in EEMs jumped dramatically. This increase in EEMs has motivated HUD Fresno, for one, to continue pre-rating its homes throughout the 1998-1999 fiscal year. In addition, HUD Fresno will continue to offer incentive bonuses to housing agents closing on an EEM.

Program Activity Indicators: As of July, 1998, SCE had signed a contract with the vendor, completed the first training session with installation contractors, and promoted the program to customers through bill inserts. Several financial institutions researched to evaluate financing program opportunities. Also as of July, PG&E had completed evaluation of 1998 options continues with the previous loan services (VIEWTECH) and lender (Fannie Mae).

The EAHAP 3rd-Party provider reports it has capitalized on HUD Fresno's program to pre-rate HUD homes for their energy efficiency by installing window stickers and point-of-purchase displays in homes going on the market. Program representatives have also attended local home shows and home buyer expositions. Training continues to prepare housing agents to answer client questions regarding HERS and EEMs and help them initiate the process for both. By mid-July, 13 EEM training classes had been held, with 208 housing agents attending. Class evaluations provided to each attendee are overwhelmingly positive. Another 17 classes are scheduled between early August 1998 and the end of the contract period. In addition, HUD Fresno has incorporated EAHAP's EEM training module into the HUD First-Time Home Buyer classes. HUD Sacramento recently closed on 12 EEMs that were tracked to real estate agents who attended the Sacramento EEM Training Classes held on May 28, 1998. These real estate agents had not closed on any EEMs in the past.

D. Program Assessment Information

Evaluation of Assumptions: Not available.

Support for Market Transformation: Gather information about current awareness of energy-efficiency mortgages among home buyers and real estate agents. Continued success will be measured by the ability to reduce the subsidy to the lending agent while showing the same level of customer participation in the program.

Conditions for Altering or Withdrawing Program: Loan interest reductions now perceived as subsidies may be found to provide risk reduction because of the energy savings and increased value of the home or business premises, and therefore allow the program to continue as a market-based interest reduction. The quality assurance phase could eventually be made self-supporting by charging a fee to the using contractor. Subsidies could be gradually phased out as the pace of loan activity is sustained with the declining subsidies.

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Appliance Early Retirement Program

A. Program Description and Objectives

Program Administrator Area: Residential Retrofit
Program Budget: New program concept provided by Appliance Recycling Centers of America (ARCA)
Program Reporting Category: Market Transformation, Residential Appliance Incentives
Program Commitment: Multi year
Program Description and Market Transformation Plan: The Appliance Early Retirement Program (AERP) is designed to save energy while encouraging the proper disposal of large household appliances whose disposal would otherwise cause harm to the environment. This program should also help raise awareness in the marketplace of the positive effects that proper recovery/disposal of such appliances can have -- both environmentally and economically.

The AERP will provide an incentive check, savings bond, or premium item to participating residential customers who dispose of used (but working) primary electric appliances because they are purchasing new appliances of the same type. The program will focus on refrigerators and free-standing freezers in 1999, and then, if appropriate, expand to include room air conditioners, clothes washers and dishwashers in program year 2000. The program will be coordinated with other Public Goods Charge (PGC) and non-PGC appliance-related energy efficiency programs being implemented by manufacturers, retailers, multi-family and mobile home property owners/managers and others. Environmental groups and community-based environmental agencies will be solicited to help market the program on the grassroots level.

A turnkey vendor will provide program services --appliance collection, processing and recycling -- in compliance with all federal, state and local laws and regulations. This vendor will be responsible for establishing and operating recycling centers, screening customers and appliances for eligibility, conducting customer surveys, providing customer incentives, scheduling and performing pickups, and recycling the appliances. In addition, the vendor will recover and recycle CFC and HCFC refrigerants, as well as non-CFC replacement refrigerants, in compliance with Section 608 of the 1990 Clean Air Act Amendments. Recycling will also involve the recovery of polychlorinated biphenyl (PCBs) for hazardous waste destruction and the recovery of used oils (from compressors and transmissions) and mercury-containing components for recycling. The removal and proper management of these hazardous materials is required under California's environmental laws (see AB1760 and AB847). Processed appliances will be recycled to recover scrap metals.

Program guidelines will require that the: (1) participant be residential electric service customers; (2) appliance be in working condition; (3) eligible appliance be full-size models (i.e., refrigerators between 10 and 25 cubic feet in volume, etc.); and 4) refrigerators and freezers are pre-1993 models.[50] Gas refrigerators will not be eligible for the program.

The AERP should have several positive impacts on the marketplace and the community. First, by capturing used appliances at the end of the "first use" segment of their life cycle and preventing these products from returning to service, the AERP will help realize improvements in the stock of electric household appliances in use by residential customers. These stock improvements should help suppliers as well as customers: a reduction in the market supply of

[50] The most recent set of energy efficiency standards for residential refrigerators and freezers took effect in 1993.

used, inefficient appliances will drive up the prices of these used appliances and will narrow the price gap between used appliances and new, more efficient ones. As a result, a larger number of new, efficient appliances are likely to be sold. Transformation of the residential large appliance market will rely on the development and implementation of a comprehensive "product responsibility" plan by appliance manufacturers, materials suppliers, distributors and consumers to self-finance this activity. Such a plan could be implemented by linking the AERP to upstream market transformation efforts in which appliance manufacturers participate and downstream efforts that encourage customers to purchase energy-efficient equipment.

Also, the AERP will help educate consumers about the true life-cycle costs of purchasing and operating appliances of various efficiencies and about the negative environmental impacts of improper appliance disposal. The AERP will thereby discourage customers who purchase new equipment from keeping their old refrigerators and freezers as "spares"[51] and from leaving their old, inefficient appliances behind when moving to a new residence.

Another positive effect of the AERP will be its demonstration that compliance with state and federal laws requiring the removal and proper management of refrigerants, PCBs, used oils and mercury components is technically feasible and commercially available. In developing and sponsoring AB 847, ARCA learned that no state or local compliance inspections have been done of appliance recycling operations in California since the effective date of AB1760 in 1994. An informal Cal/EPA "survey" of parties handling appliances in 1997 revealed that fewer than 25% were found to be in general compliance. To date, the Cal/EPA's Department of Toxic Substances Control has not implemented any of the requirements of AB847. There is anecdotal evidence that non-compliance with the existing laws is widespread.

Finally, by linking the AERP to other market transformation efforts in California and thereby requiring PGC-supported appliance manufacturers, materials suppliers, distributors, and retailers to take responsibility for the end-of-life-cycle management of old appliances, AERP would play an important role in increasing sensitivity to the environmental consequences of materials disposal. This heightened awareness can lead to more efficient disposal, reduction in the variety of materials used in appliance construction, an increase in the use of recyclable plastics and metals (rather than hazardous materials) in equipment construction, and the implementation of Design for Environment principles. Design for Environment (DfE) is the systematic consideration during design of issues associated with environmental safety and health over the entire product life-cycle. Agencies such as the Department of Energy are applying DfE with the objective of minimizing or eliminating, during design, the anticipated waste generation and resource consumption in all subsequent life-cycle phases (production, use and disposal).

Program Implementers and Affiliates: Contractor, appliance manufacturers, materials suppliers, distributors, retailers, local governments, environmental organizations and agencies
Customer/Building Type: All residential
Energy End Uses: Household appliances (refrigerators and freezers in 1999, with the possibility of adding room air conditioners, clothes washers, dishwashers in the future)
End-Use Technologies, Services, Practices: Recycling old (but operable) appliances
Customer Geographic Area: Statewide

[51] Note that refrigerators that do become "spares" are eligible for disposal through Edison's Spare Refrigerator Recycling Program only after they have been "spares" for six months or longer.

B. Market Transformation Characteristics

Market Event: Retiring (through recycling) older appliances at the end of their first-use
Market Barriers Addressed: Hassle or transaction costs, bounded rationality, service or product unavailability, externalities (costs/benefits of proper disposal), organizational practices (provides incentive for property managers to dispose rather than resell), information or search costs (on-demand appliance recycling services, particularly those that comply with environmental laws, are not widely available) and misplaced or split incentives (reduces the supply and increases the cost of used appliances to rental property owners/managers).
Market Barriers Not Addressed: Inseparability of product features.
How is the market changing (if at all)? According to Home Energy Magazine, the used appliance market keeps inefficient appliances in operation many years after the expected lifetime.
Other Market Transformation Activities In or Outside California: SMUD (see "SMUD's Refrigerator Graveyard -- Conditions of the Deceased" Home Energy Magazine, Jan./Feb. 1993) and "Devils Discovered in Details" Home Energy, July/August 1998.
Proposed Services Provided to Market Actors:
Appliance Early Retirement Program

	Services Provided to Market Actors							
Market Actor	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Standards, Labeling	Demon-stration	3rd-Party Experts	Other: Appli-ance Disposal
Home Owner, Property Manager				Incentives				Yes
Designer/Specifier								
Contractors	Yes		Customer Contacts					Provide
Retailers								
Distributors								
Manufacturers								
Lending Agents								
Other:								

C. Indicators of Program Performance

Energy or Value Indicators: Cost effectiveness calculations by E. Rubenstein of Schiller Associates, indicate a levelized cost of saved energy of 0.017 $/kWh.[52] For refrigerators and freezers alone, the potential size of the AERP program is estimated to be roughly 600,000 units (550,000 refrigerators and 50,000 stand-alone freezers). Assuming the program will be able to capture 35% of these units (approximately 191,000 refrigerators and 21,000 freezers) during the first year of implementation, savings from the units are estimated at nearly 380 GWh (assuming first-year savings of 1,791 kWh/appliance). The program-weighted measure lifetime is 10 years.

Similar programs that have metered old, inefficient refrigerators have found that the energy efficiency of the equipment degrades significantly over time. For example, SMUD found that the average annual energy use of standard refrigerators in its study ranged from 2,120 to 3,139 kWh/year, with maximums between 3,737 and 4,706 kWh[53]. Similarly, a Florida program recently reported on a retrofit project to replace a 1983 GE TFF 25 cubic-foot side-by-side

[52] Based on average first-year savings of 1,791 kWh, cost of $240, lifetime of 10-years, and a 5% discount rate.
[53] See *Home Energy Magazine.* Jan./Feb. 1993

refrigerator that consumed 3,040 kWh during one year of energy monitoring. The new refrigerator, a Whirlpool 25 cubic-foot Super Efficient side-by-side unit that consumed 849 kWh/year, yielded first year savings of 2,190 kWh. ARCA, Planergy, Proctor Engineering Group, Lawrence Berkeley Labs (Alan Meier) and Southern California Edison have all conducted similar refrigerator energy monitoring studies and found similar results. Additional research is needed to develop an energy monitoring database of end-of-life-cycle freezers, room air conditioners, clothes washers and dishwashers to assess inclusion of these appliances.

Market Indicators: Used appliance dealers are more likely to experience market impacts from the AERP because recently replaced appliances make up the majority of their product supply (disposed secondary appliances make up a significantly smaller portion of the used appliances offered for sale). According to AHAM, the Association of Home Appliance Manufacturers[54] more than 840,000 refrigerators are sold in California annually. Most of these refrigerators are sold to replace existing equipment. A 1996 study by AHAM revealed that only 31% of the appliance owners who replaced their existing refrigerator did so because of costly repairs or the refrigerator no longer operated. Twenty-four percent (24%) replaced their refrigerator because they wanted a new model with updated features, 5% as a result of home remodeling and 41% as the result of moving[55]. This same study showed that while 14% of consumers nationally keep their old refrigerator to use as a spare, most consumers use appliance haul-away services provided by appliance delivery/retail companies. (See attached tables for additional information) These companies sell the older, inefficient appliances to local used appliance dealers, who in turn market them to customers who will use them as either primary or spare appliances. Often, these used appliances are purchased by rental property owners/managers. More than 500,000 working refrigerators are sold annually in the second hand market in California. Without the Appliance Early Retirement Program recycling of operable or easily repairable appliances is unlikely to occur because the $100 - $300 retail market price for a working refrigerator is significantly higher than the current $18/ton or $1.30/unit scrap steel price for "white goods." Furthermore, scrap prices must be off-set by appliance processing costs (CFC recovery/ recycling, PCB removal/disposal, oil recovery/ recycling), making recycling unprofitable without PGC funding and/or legitimate service fees.

Program Activity Indicators: The statewide program is initially designed to remove and recycle 211,750 refrigerators and freezers per year.

D. Program Assessment Information

Evaluation of Assumptions: Number of scrapped appliances tracked by retailers and vendors would be the key indicators for evaluation purposes.

Support for Market Transformation: The following methods for determining program success at market transformation have been suggested by Southern California Edison (Spare Refrigerator Recycling Program administrator) and are likely to be applicable to this companion program:
1) Probability-based surveys of customers show that, relative to 1990 and 1995 Residential Appliance Saturation Survey results, significantly fewer customers own spare appliances, customers are discarding appliances in a manner that does not lead to continued use (such as keeping, selling, giving away, trading in, or leaving behind when moving), customers are

[54] See "Industry Statistics, Estimated Distributor Sales by State." *1996.*
[55] See *Home Appliance Saturation and Length of First Ownership Study, 1996.*

significantly less likely to purchase a used refrigerator, and the share of purchases which are used appliances diminishes significantly.
2) Survey evidence that an increasing percentage of operable, replaced primary appliances, when discarded, are released to companies that are certified (by government or industry) to provide recycling (not reuse) in compliance with environmental laws and industry commitments.
Conditions for Altering or Withdrawing Program: The program should operate at the suggested level for several years, in combination with a spare appliance recycling program, to exhaust the existing stock of spare appliances in California (approximately 15-20% of all residential customers currently own a spare refrigerator). Once the spare appliance stock is exhausted, the Appliance Early Retirement Program would continue to reduce the stock of replaced, primary appliances traditionally sold through the used appliance market. The program subsidy will be reduced, and eventually withdrawn, when and if a comprehensive "product responsibility" scheme is adopted by the appliance industry (see "Support for Market Transformation" above). In its 2nd Quarter 1998 program status report on the Spare Refrigerator Recycling Program, SCE recommends that the current program be altered to allow recycling of replaced primary refrigerators, in addition to spare refrigerators and freezers, in order to capture significant energy savings and prevent their return to use through the used appliance market. Instead, ARCA recommends that an Appliance Early Retirement Program be implemented, in combination with the existing program, so that the recovery/disposal of these refrigerators and freezers can be addressed in 1999 and additional appliance types can be added in the future.

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Integrated Residential Retrofit

A. Program Description and Objectives

Program Administrator Area: Residential
Program Budget: New Program Concept submitted by the CEC
Program Reporting Category: Residential Retrofit
Program Commitment: Multi-year
Program Description and Market Transformation Plan: The objective of the Integrated Residential Retrofit (IRR) Program is to create a robust market for retrofit services by 1) providing training to contractors on the value of performance testing in identifying the customer's needs and improving their own technical skills, and 2) stimulating demand for retrofit services that address the whole house. The program would provide training, diagnostic equipment, and incentives to contractors to use audits and diagnostics to identify energy, durability, and health and safety problems and to prioritize recommended retrofit work based on test results and desired performance objectives. Measurement and verification methods are used to validate the achievement of performance objectives. This program complements the residential SPC program. The marketing component of the program will educate home owners on the co-benefits of improved efficiency: improved comfort, safety, lower maintenance and energy bills, air quality benefits (both indoors and out), and durability. As contractors become comfortable with the performance-based approach, they will be encouraged to guarantee reduced energy bills or improved comfort as a credible, enforceable signal to consumers that can help contractors differentiate themselves. A more comprehensive framework for retrofitting than the component-based approach, this program will help contractors and energy service companies learn how to identify and facilitate appropriate improvements, allowing them broaden their line of products and services. Instead of current practices[56], contractors will be motivated to learn and apply new methods to improve building performance during retrofit projects. Because the existing home market is so large, this can provide a stable source of revenue compared to the cyclical new construction industry, helping the energy services industry to become more established.

Below is an illustrative description of key program steps.
Example Program Steps

1. A collaborative of implementers and affiliates would work with contractors/energy service providers to collect and refine existing diagnostic protocols and performance targets/guidelines. The CEC has already begun developing protocols for ducts and envelope as part of its Energy Efficient Homes Program.
2. Obtain participant contractors in the pilot area by offering cost incentives, training, access to diagnostic equipment and marketing support. These contractors and other related players would then begin thorough, ongoing training on the protocols and in using duct blasters, blower doors, infrared cameras, and other state-of-the-art equipment.
3. Develop infrastructure support for diagnostics, for example by working with a nonprofit trade organization to offer a tool library, or induce equipment rental companies to carry diagnostic

[56] Current practices include low bid, quick and marginal installation with no performance targets or use of diagnostic testing equipment, use of untrained and unskilled low cost laborers, and cheap and minimal efficient appliances and products.

equipment.

4. Work closely with participating contractors on initial demonstration projects to demonstrate the value of testing procedures. Incremental costs would be paid with program funds. Feedback on installation quality would be provided to contractors.
5. Partnerships with financial companies would be developed to make financing easier, (such as by expanding the availability of EEMs) and provide information to borrowers about enhanced benefits of performance based retrofitting. Another option to improve affordability for the homeowner would be to create a revolving fund for the program. Such a fund could be used to defray some of the cost of equipment purchase and installation, and then be recovered through monthly payments (perhaps added to the utility bill). Such an option would be best combined with a bill guarantee to insure that customers don't end up paying higher energy bills than prior to their participation in the IRR Program.
6. A focused and intense marketing program to homeowners in the target area would be developed and undertaken to make consumers aware of the co-benefits of performance based retrofits. This could include videos that illustrate the effects of system problems and what the contractor ought to be doing to identify and remedy problems. Provide marketing materials that contractors can use to customize their own marketing efforts. This component could also be combined with other education or marketing programs, such as the Affordable Comfort/Home Energy Magazine project. Combining this with marketing for a new home program in the same region could leverage program benefits.
7. As contractors gain expertise in the approach, a critical evaluation step is to assess whether the testing process in and of itself provides the necessary feedback between contractor and customer. If contractors are able to sell the service, and are able to lower costs, incentives could be phased out, while maintaining some marketing support until the market is mature. If, however, contractors who are confident in their testing and remediation skills still find it difficult to communicate value to potential customers, further program development may be needed.
8. If judged necessary in step 7, begin researching and testing algorithms for estimating an appropriate performance guarantee (possibly working with home energy rating providers or organizations such as ASHRAE to develop guidelines). This program component should explore ways to provide a comfort guarantee, as some market participants are already doing.
9. Work with contractors to test and implement the energy bill/comfort guarantee as a way to gain market share.

The market transformation plan aims to develop a sustainable consumer demand for an integrated performance-based approach to residential energy retrofits. Increased marketing and information about the co-benefits of performance-based retrofits will increase demand from homeowners for contractor services backed by diagnostic and verification testing and guaranteed results. Increased demand for energy efficient equipment will allow the manufacturing and distribution sector to lower wholesale prices, thereby making performance-based retrofits no more costly to produce than current practice. Insuring of the energy bill and comfort guarantee provides homeowners a standard for performance. Rather than accepting discomfort homeowners will provide feedback to contractors on the value of safe, comfortable, efficient homes and the quality of their work. This will give contractors a mechanism to identify problem areas, as well as a continuing incentive to improve their building performance expertise. The market transformation will become sustainable

as increased consumer demand, lower costs, and greater availability of skilled installers and diagnosticians lead other contractors to adopt the performance-based approach, possibly with some type of performance guarantee.

Program Implementers and Affiliates: Energy Service Companies (ESCOs), Energy Efficiency Service Providers (EESPs), Contractors, Energy Consultants, Engineers, CEC, DOE, EPA, and utilities.

Customer/Building Type: Single Family Residential

Energy End Uses: HVAC, lighting, water heating, appliances, miscellaneous.

End-Use Technologies, Services, Practices: HVAC system efficiency, water heating system efficiency, insulation installation techniques, lighting, fenestration, appliances.

Customer Geographic Area: An initial, focused, pilot should focus on a highly populated, more extreme climate zone, such as Central Valley, with a large older housing stock.

B. Market Transformation Characteristics

Market Events: System remediation/optimization, renovation/rehab (in which Title-24 is invoked), renovation/rehab without Title 24.

Market Barriers Addressed: Organizational practices or customs, performance uncertainties, information costs, hassle or transaction costs, product availability, split incentives.

Market Barriers Not Addressed: Inseparability of product features, asymmetric information or opportunism, bounded rationality, access to or understanding of financing, inseparability of product features.

How is the market changing (if at all)? While some contractors are using performance testing, and a few offer bill guarantees, they are niche players. The integrated systems/performance testing approach is being used by some contractors in California, such as Quality Assured Comfort and H & L Energy Savers. In New York, the Building Performance Contractors Association promotes its membership of building performance contractors, building diagnosticians, energy auditors & consultants who provide services using the integrated systems approach. (http://www.home-performance.org/). Bill guarantees are being provided by a smaller number of firms such as Chitwood Energy Management Services. In general, performance-based contractors are advertising improved comfort, health and safety, efficiency and durability, rather than focusing only on energy savings. (A list is available on request)

Other Marketing Activities in (or Outside) California: Affordable Comfort and Home Energy Magazine have developed brochures to help homeowners identify when and how a performance contractor could solve comfort, health, and durability problems. EPA's Energy Star residential retrofit program is also likely to focus on providing information to consumers to aid in selecting a contractor. The Comfort S.E.A.L. program operated by the Eugene Water and Electric Board has provided duct sealing to over 2000 manufactured homes using a simplified field protocols. "Before" and "after" blower door tests provide an immediate "cost effectiveness meter" by which the contractor can quickly judge the efficacy of duct sealing and established the point at which most of the duct sealing has been accomplished. Recommended program procedures gave precedence to indoor air quality.[57]

[57] "Savings from an Expedited Duct Sealing Program for Mobile Homes," 1998 ACEEE Proceedings, pp. 2.259.

Services Provided to Market Actors:
Integrated Residential Retrofit Program

Market Actor*	Services Provided to Market Actors							
	Information, Advertising, Websites	Training & Tools	Financial Help	Guidelines/ Protocols	Demonstration	Project Assistance	Guaranteed Energy Bills	Integrated Retrofits
Home Owners, Property Manager	Yes (Info. & Audits)		Perhaps loans				Perhaps	Yes
Contractors	Yes	Yes	Incentives				Perhaps provide	Provide
Lending Agents		Yes		Yes				
Building Dept. Personnel, Local Government		Yes		Yes	Yes		Yes	
Home energy raters	Yes	Yes	Incentives					
ESCOs, EESPs	Yes	Yes	Incentives					
Other:								

C. Indicators of Program Performance

Energy or Value Indicators: Energy savings of 20-40% per house, improved indoor air quality, comfort, durability, and quiet. The effectiveness of the testing and verification process in retrofits has been demonstrated. For example, the New York TIPS weatherization program (which used an instrumented audit procedure) improved energy savings from average of 7% to 43% by basing spending on Btu/ft^2 algorithm, while reducing program costs. The Advanced Customer Technology Test (ACT^2) found savings of 40-50% by applying the integrated design approach advocated here to two existing home retrofits. For a comprehensive retrofit of a 2200 ft^2 Stockton residence, the energy savings were 6839 kWh/yr. and 701 therms/ at an estimated mature market cost of $6104 and a benefit/cost ratio of 1.77. Assuming a program budget of 2 million, first year energy savings would be 525,000 kWh and 56,875 year (using a more conservative 4200 kWh and 455 therms per house per year), with a discounted payback of 11 years. Program-weighted measure life is 15 years.

Market Indicators: More contractors will use diagnostics before and after implementing retrofits. The number of homes using contractors/EESPs for maintenance and discretionary system improvements should increase. The diagnostic equipment should become more widely accessible to contractors, either through lower cost or rental/loan arrangements. A greater variety of efficient products and services will be available and sold. Homeowners should evidence a better understanding of the relationships between home systems operation and maintenance, energy use, and health, safety, and comfort.

Program Activity Indicators: Number of contractors following testing protocols, number using a guarantee feature, number of projects completed by each.

D. Program Assessment Information

Evaluation of Assumptions:

The key assumptions are that program contractors will gain market share/profits through use of a performance-based approach, and that the use of guarantees (with their attendant motivation to continue to improve efficiency) will continue to spread after incentives are withdrawn because of a combination of consumer demand and lower costs.

1. The systems engineering approach will spread as distribution costs fall and skill levels rise: The minimum scale of the program necessary for these assumptions to prove true should be investigated through dialog with manufacturers, distributors, contractors, and builders.
2. Contractor motivation: The spread of the concept will require contractors to change some business practices and protocols. Providing a guarantee may also be (perceived as) more difficult by small contractors. The program must continually monitor and evaluate contractor receptivity to find workable strategies for participants to adopt program practices.
3. Demonstrated Test Results and/or Guarantees will attract homeowners: Receptivity of homeowners to performance-tested contractors can be evaluated before the program by looking at the success of contractors who are using this approach, and by market-testing promotional materials to see what issues draw the greatest response from consumers. Existing guarantee programs should be reviewed to see whether, as predicted, programs that more effectively convey the co-benefits of lower energy use elicit greater consumer response.

Support for Market Transformation: Evidence of market transformation will be increasing numbers of contractors that compete for market share by innovating with respect to building performance, comfort, and energy efficiency.

Conditions for Altering or Withdrawing Program: As capital and labor costs fall, the guarantee program will be profitable without subsidies, so payment for incremental participation costs and other program assistance can be withdrawn.

References:

Synertech Systems Corporation. "Instrumented Audits Technology Transfer Project: Final Report Prepared for the New York State Energy Research and Development Authority." *Energy Authority Report 94-6*. Syracuse, NY. December, 1993.

Anne Minor West, et al. 1998. “Savings from an Expedited Duct Sealing Program for Mobile Homes”. *In Proceedings of the ACEEE 1998 Summer Study on Energy Efficiency in Buildings,* 2.261 Washington, DC: American Council for an Energy-Efficient Economy.

Eley Associates. 1996. *ACT2 Stockton Residential Site Impact Evaluation Report (Draft).* Prepared for the Research and Development Department, Pacific Gas and Electric Company, San Ramon, California. http://.pge.codcustomer_seficedother/pec/act2/act2over.html

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New Construction Groups of "Like" Programs in California and Other States[58]

1) Energy-Efficient Manufactured Housing Promotion (out-of-state)

Super Good Cents Manufactured Housing/Manufactured Housing Advertising (NEEA)

2) Design Tools and Practices (new PY98 utility)

Daylighting Design Tools (PG&E)
Building Commissioning and Performance Tools (PG&E)
Commercial Refrigeration Computer Simulation Tool (PG&E)
Cool Tools (PG&E)
The Lighting Exchange (PG&E)
Energy Design Resource (SCE)
Nonresidential Energy Efficiency Simulation Modules Development (SCE 3rd-party)
Leading Edge Student Design Competition (SoCalGas 3rd-party)

3) Energy Centers (existing utility)

Pacific Energy Center (PG&E)
Study of Energy Information Center Network [residential and industrial centers] (PG&E)
Lighting Design Lab (NEEA)

4) Title 24 Enforcement Education (3rd-party and out-of-state)

California Energy Efficiency Enforcement Training (SoCalGas 3rd-party)
Building Code Inspector Training (ECW-Wisconsin)

5) Standards and Protocols (new utility, 3rd-party, and out-of-state)

Energy Standards (PG&E)
Improving C&I New Construction Energy Efficiency through Standards and Protocols (SoCalGas 3rd-party)
Enhanced Building Energy Code Standards and Implementation (NEEP)
New Construction Project - formerly Northwest Building Practices (NEEA)

6) Residential Marketing/Incentives (existing utility and 3rd-party)

PG&E Comfort Home
SCE Home/ComfortWise (SCE)
ConSol ComfortWise (SCE, SDG&E and SoCalGas 3rd-party)
Energy Advantage Home (SoCalGas)

[58] Programs are listed as "Existing Utility Programs" if they include any existing utility programs, as this indicates a higher standard of documentation (i.e., regulatory filings, M&E studies, and market effects studies) should be available than for new programs.

7) Nonresidential Incentives/Marketing (existing utility)

Incentive Program - System and Design Analysis (SCE)
Savings Through Design (SDG&E)

8) Residential Design Assistance (new PY98 utility)

Residential Energy Design Assistance (SDG&E)

9) Nonresidential Design Assistance (existing utility)

Design Assistance Using Simulation Tools [filed as Design Assistance in June] (PG&E)
Nonresidential Energy Design Assistance (SDG&E)
Commercial EMS Program - New Construction Design Consultation (SoCalGas)
Architecture + Energy: Building Excellence in the Northwest (NEEA)
Northwest Lighting On-line (NEEA)
Green Commercial Buildings (ECW-Wisconsin)
Daylighting Collaborative (ECW-Wisconsin)

10) Residential/Small Commercial Demonstration (new PY98 utility and 3rd-party)

Natural Cooling Program (PG&E)
Home Cooling Program (PG&E 3rd-party)
GeoExchange Demonstration (PG&E)
Residential and Small Commercial Emerging Technologies (PG&E)
High Efficiency Air Conditioning Showcase (SCE)
Heat Pumps Project (ECW-Wisconsin)

11) Commercial/Industrial/Agricultural Demonstration (existing utility)

Market Transformation Showcases (SCE)
Select Technologies (SoCalGas)

12) Premium Efficiency Relocatable Classrooms (PERC) Demostration (new PY98 utility)

Premium Efficiency Relocatable Classrooms (PERC) (PG&E)

13) Developing Green Communities (new PY98 utility and 3rd-party)

Local Energy Assistance Program (LEAP) (PG&E, and SoCalGas 3rd-party)
Local Government Energy Efficiency Awareness (SCE)

14) New Construction Nonresidential Standard Performance Contract (new concept)

15) Integrated Systems Residential New Construction (new concept)

Energy-Efficient Manufactured Housing Promotion

A. Program[59] Description and Objectives

Program Administrator Area: New Construction
Program Budget: Out-of-State Program. The NEEA 3-year budget is $1.4 million. This is expected to cover about half of the project costs. The remainder will be provided by venture partners and revenues.
Program Reporting Category: Not applicable
Program Description and Market Transformation Plan: The Energy-Efficient Manufactured Housing Promotion program (EEMHP) is intended to increase the market share and maintain infrastructure support for manufactured homes with energy efficiencies over 30% above the national standard[60]. The program includes regional marketing (including television advertising), retailer sales training and marketing support, promotion of energy-efficient financing for purchase of qualifying manufactured homes, and educational efforts--tailored to needs in each of the four Northwest states--to ensure proper site preparation and installation of qualifying manufactured homes.

The market transformation plan is based on the idea that an educated consumer population will demand highly energy-efficient manufactured housing and access to financing will enable them to pay for energy-efficient features. Educated retailers are expected to reinforce and respond to this demand by putting "upward pressure" on manufacturers to produce and install more such homes. Ultimately, highly energy-efficient manufactured homes are anticipated to become standard industry practice.
Program Implementers and Affiliates: NEEA, utility staffs, government, and consultants.
Customer/Building Type: Customer: residential; Building Type: manufactured homes
Energy End Uses: HVAC, lighting, refrigeration, water heating, cooking
End-Use Technologies, Services, Practices: HVAC, lighting, windows, insulation, building systems, appliances, water heaters
Customer Geographic Area: Pacific Northwest

B. Market Transformation Characteristics

Market Event(s): New construction
Market Barriers Addressed: Organizational practices or customs, performance uncertainties, information or search costs, asymmetric information or opportunism, access to financing, and service or product unavailability
Market Barriers Not Addressed: Hassle or transaction costs, bounded rationality, misplaced or split incentives, and inseparability of product features
How is the market changing (if at all)? This venture builds upon Alliance-sponsored marketing in early 1997 to promote the virtues of manufactured homes built to Super Good Cents standards. Market penetration of such homes had dropped below 75 percent since the Bonneville Power Administration-sponsored Manufactured Housing Assistance Program (MAP) ended in 1995.

[59] Note that for 1998 programs, "program" is the *combination* of similar utility-sponsored programs.
[60] This level of efficiency is called the "Super Good Cents" standard because it was established by a Bonneville Power Administration program of that name.

That program had effectively captured the entire regional market for electrically-heated manufactured housing.

Other Market Transformation Activities In or Outside California: None identified

Services Provided to Market Actors:

Energy-Efficient Manufactured Housing Promotion

	Services Provided to Market Actors							
Market Actor	Information, Advertising, Websites	Training & Tools	Financial Help	Alliances, Labeling, Standards	Demon-stration	Project Assist-ance	3rd-Party Experts	Other:
Building Owners, Operators	Yes							
Designer/Specifier								
Builders								
Contractors								
Lending Agents	Yes							
Consumers	Yes							
Other: Retailers		Yes						

C. Indicators of Program Performance

Energy or Value Indicators: Not available.

Market Indicators: Market penetration of highly energy-efficient manufactured homes is the most readily available indicator of efficiency levels of building construction. Bonneville Power Administration's Super Good Cents program provides an indicator of the program's potential for success.

Program Activity Indicators: Numbers of commercial spots run and numbers of targeted marketing campaigns conducted.

D. Program Assessment Information

Evaluation of Assumptions: Not available.

Support for Market Transformation: Market penetration of highly energy-efficient manufactured homes without the use of incentives will be the most readily available indicator of a transformed consumer awareness of energy efficiency.

Conditions for Altering or Withdrawing Program: Consumers will always need information about energy efficiency to combat tendencies to look only at sticker price and not at life cycle costs. If manufacturers and builders themselves advertise the merits of energy efficiency competitively, and if consumers continually respond to these efforts by demanding energy-efficient buildings and homes, mass media campaigns may not be necessary.

References:

Northwest Energy Efficiency Alliance. *Super Good Cents Manufactured Housing/Manufactured Housing Advertising*. URL:http://www.nwalliance.org. 1998.

Design Tools and Practices

A. Program Description and Objectives

Program Administrator Area: New construction
Program Budget: PY98 California PGC DSM Budget $5.4 million. Program grouping consists primarily of new PY98 utility programs. Budget not provided for SCE 3rd-Party program.
Program Reporting Category: Nonresidential new construction and residential new construction
Program Commitment: Multi-year
Program Description and Market Transformation Plan: The Design Tools and Practices Program provides energy efficiency software tools, technical "how to" manuals, training and demonstrations for architects, design professionals, and end-users, as well as case studies of successful projects. National advisory boards provide guidance for these efforts. The common objective is to make it easier for market actors to develop a quantifiable basis for comparison between standard and high efficiency options. Design Tools and Practices covers the following areas: lighting, daylighting, HVAC, building systems, controls, refrigeration, and building commissioning.

The market transformation plan is to make user-friendly software design tools widely available to the appropriate market actors. This, in combination with training and demonstrations, manuals, and case studies is intended to help to make the use of these tools commonplace and provide quantitative information to aid in the design process. These programs will create sustainable effects to the extent that the tools remain useful to the design community.

The Design Tools and Practices Program also includes $80,000 in funding for the "Leading Edge Student Design Competition" a PY98-funded 3rd-Party proposal that promotes energy efficiency and environmental awareness in the architectural design of residential and mixed-use buildings. The goal of the competition is to provide teaching and applied learning experience on the principals and requirements of energy efficient design. In the first six years of the competition, more than eighty-five colleges and universities competed, providing energy efficient design exposure to thousands of design professionals.
Program Implementers and Affiliates: Consultants, utility staff, vendors
Customer/Building Type: All sizes of commercial and industrial buildings
Energy End Uses: Space heating, cooling, lighting, refrigeration, controls.
End Use Technologies, Services, and Practices: HVAC, advanced lighting, daylighting, high performance windows, architectural design practices, high efficiency refrigeration system design, energy management systems, building commissioning and performance assessment, education, training, demonstration
Customer Geographic Area: All CEC climate zones

B. Market Transformation Characteristics

Market Event: Primary: new construction; secondary: renovation with or without Title 24
Market Barriers Addressed: Organizational practices or customs, performance uncertainties, information or search costs, asymmetric information or opportunism, misplaced or split incentives, and service or product unavailability
Market Barriers Not Addressed: Hassle or transaction costs, bounded rationality, access to or understanding of financing, and inseparability of product features

How is the market changing (if at all)? Market research conducted by PG&E for the three programs indicates that designers will use such tools, and that the lack of such tools is effectively a market barrier best characterized as performance uncertainty.

Other Market Transformation Activities In or Outside of California: The Northwest Energy Efficiency Alliance (NEEA) partners with the Seattle-based Lighting Design Lab to provide information and training to lighting professionals and students in the Northwest.

Services Provided to Market Actors:

Design Tools and Practices

	Services Provided to Market Actors							
Market Actor	Information, Advertising, Websites	Training and Tools	Financial Help	Alliances, Labeling, Standards	Demon-stration	Project Assist-ance	3rd-Party Experts	Other: Awards
Building Owners, Operators		Yes						
Designer/Specifier		Yes						
Builders								
Contractors								
Lending Agents								
Others: Students								Yes

C. Indicators of Program Performance

Energy or Value Indicators: No available.

Market Indicators: Although no reports are available, PG&E indicates in its second quarter filing that building owners and customers who have received information resulting from the Building Commissioning and Performance Tools project are very receptive to implementing changes to achieve the benefits that have been identified. In one case the energy manager at a university campus is using the results to set the direction for upcoming energy efficiency projects.

Program Activity Indicators: As of the second quarter filing, PG&E reports that software development is underway and on schedule, baseline studies to establish the current state of design practice are approximately 75% complete, candidate sites have been identified, and field staff are trained to use analysis software. In addition, SCE reports in its second quarter filing that a new publication demonstrating the latest and most effective design techniques and technologies will be available as separate, yet integrated, design briefs or as a complete manual of energy efficient design practices. There are six topics currently in production. Skylighting guidelines are being prepared which will describe key skylighting design issues, and will include case studies and specification guidelines. A building creation wizard is being designed as a simplified PC-based application to perform building energy use analysis throughout all design phases. An integrated series of workshops on energy efficient new construction will be held to update architects, and lighting designers, mechanical engineers, and building owners and developers. Multiple sessions of each workshop will be given in convenient locations. A specialized Website geared to the needs of the Southern California design and construction community will soon be available to deliver the energy efficient product and practices information needed by practitioners in this competitive arena. All information and tools included in the program will be available on a Website.

D. Program Assessment Information

Evaluation of Assumptions: Most of the programs include an industry feedback component at various stages in the process. For example, the Daylighting Study is building on the experience of

researchers at LBNL, who have already done work to test relevant assumptions. Other programs, such as the Building Commissioning program, will use feedback from industry to calibrate models as they go. Cool Tools and the nonresidential energy efficiency simulation modules were designed with input from design professionals, vendors, and manufacturers. Market actors who use these tools or participate in training are being surveyed, and these surveys will be used to evaluate key assumptions regarding the success or failure of various elements of the Design Tools and Practices Program. Additionally, there has been some baseline work to document design practices and methods that could be repeated to measure market movement.

Support for Market Transformation: Most of the programs included in this area involve developing software tools for designers. A good initial indicator will be the number of copies of the software that are distributed and downloaded off the web. This is particularly true for web downloads, because that number will only reflect people who have made a conscious choice to seek out the tool. In the long term, market transformation will be judged by the degree to which the various design communities involved incorporate energy efficiency into their design decisions. One measure of this might be the change in the percentage of new buildings that exceed Title 24. This may be difficult to judge, as the availability of design tools is only one factor influencing how designers approach their work; customer preferences and the ability of designers to market the need for energy efficiency are also important. As such, it will be difficult to gauge which changes in the market are responsible for changes in design practices.

Conditions for Altering or Withdrawing Program: The foremost factor in whether these programs should be altered or withdrawn is the acceptance of the tools in the relevant design community. Although use of the tools is not a direct measure of whether the desired market affect (change in design practices) is being achieved, it is much easier to measure and should be a good indicator of changes in design practices.

References:

Northwest Energy Efficiency Alliance. *Lighting Design Lab*. URL:http://www.nwalliance.org. 1998.

Pacific Gas and Electric Company. *Application of Pacific Gas and Electric Company for Approval of 1998 Energy Efficiency Programs, Shareholder Incentive Mechanism for 1998 Programs, as Cost Accounting Process for Transfer of Surcharge Funds, and Update of Energy Efficiency Commitments.* San Francisco, CA. October 1997.

Pacific Gas & Electric Company. *1998 Customer Energy Efficiency Programs, Advice Filing 2086-G/1776-E, Attachments.* San Francisco, CA. June 1998.

Pacific Gas & Electric Company. *PG&E Second Quarter Status Report.* San Francisco, CA. July 1998.

Pacific Gas and Electric Company. William Miller and Peter Turnbull. "PG&E Energy Efficiency Program Supplemental Information." San Francisco, CA August 1998.

Pacific Gas and Electric Company. "Personal Communication with Peter Turnbull." San Francisco, CA August 17, 1998.

Southern California Edison, *Appendix B to the Testimony of Southern California Edison in Support of the 1998 DSM Program Funding,* October 1997.

Southern California Edison Company. *Extension of 1998 Energy Efficiency Program Plans and Performance Award Mechanisms.* Rosemead, CA. June 1998.

Southern California Edison Company. *1998 Energy Efficiency Programs, Quarterly Report Second Quarter*. Rosemead, CA. July 1998.

A. M. Eun-Sapsis. *Southern California Gas Company 1998 Energy Efficiency Program Third Party Initiatives Program*. California Building Industry Foundation, Sacramento, CA. December 27, 1997.

Energy Centers

A. Program[61] Description and Objectives

Program Administrator Area: New Construction
Program Budget: PY98 California PGC DSM Budget $2.0 million. This program grouping consists primarily of existing utility programs. The $2.0 million budget includes new Energy Information Center studies.
Program Reporting Category: Nonresidential and Residential New Construction
Program Commitment: Multi-year
Program Description and Market Transformation Plan: Energy Centers offer demonstrations, educational seminars, information, and consulting assistance concerning state-of-the-art, energy efficient design, technology, and practice. Energy Centers provide objective information to business customers seeking to improve their equipment or meet legal standards, as well as to architects, engineers, builders, or contractors. Energy Centers house facilities where training and educational seminars are sponsored and held and supply both general and individualized assistance.

Energy Centers achieve market transformation by providing technical support for many other DSM and energy-efficiency market transformation programs such as the incentives programs, EMS programs, and audit programs. Energy Centers offer an energy-measurement equipment lending library and training and assistance in the use of such equipment. Energy Centers serve end users, design professionals, ESCOs and others who need to use energy-measurement equipment for measurement and verification purposes. Energy Centers provide key "third party" services between customers and vendors of energy equipment by verifying the performance of equipment to reduce performance uncertainty. Energy Centers also lower barriers of information costs associated with implementing energy efficiency by providing a consolidated resource at low or no cost. Technical training and resources offer a unique resource for design professionals to gain knowledge of state-of-the-art methods in energy efficiency. Services such as tool lending and general training provide energy service professionals with support they need to establish their own business independent of Energy Center support.
Program Implementers and Affiliates: Utility staff, consultants.
Customer/Building Type: All commercial and residential building types
Energy End Uses: HVAC, lighting, water heating, refrigeration, miscellaneous equipment.
End-Use Technologies, Services, Practices: Efficient building/facility design, energy system interactions, HVAC, lighting, daylighting, windows, appliances, efficient technologies, and controls.
Customer Geographic Area: Pacific Energy Center serves the San Francisco Bay Area and Northern California, the proposed Residential Building Technology Center would serve the Central Valley and Northern California.

B. Market Transformation Characteristics

Market Event(s): New construction, renovation, planned replacement, retrofit.
Market Barriers Addressed: *Information or search costs* learning about and identifying energy-efficient design techniques practices, and technologies; *asymmetric information* from vendors of

[61] Note that for 1998 programs, "program" is the *combination* of similar utility-sponsored programs.

products confuses customers; *performance uncertainty* of energy efficient equipment or designs leads to conservatism; *bounded rationality*, or a lack of understanding of energy system interactions or rules of thumb and customs that limit the scope of decision-making processes.
Market Barriers Not Addressed: Organizational practices or customs, hassle or transaction costs, access to or understanding of financing, misplaced or split incentives, inseparability of product features, and service or product unavailability
How is the market changing (if at all)? Not available.
Other Market Transformation Activities In or Outside California: The Northwest Energy Efficiency Alliance (NEEA) provided funding of $1.8 million for a Lighting Design Lab in Seattle, WA. The Lab encourages commercial and residential building designers and specifiers of lighting equipment to explore and implement energy-efficient, state-of-the-art lighting design in a manner similar to the way the Energy Information Center does in the San Francisco Bay Area. (See other California utility-sponsored Energy Efficiency Center Program summary under Nonresidential Retrofit Administrator Area.) The Western Energy Center Council, which includes participation by PG&E and SCE, works to collaborate on services to a wider range of users. PG&E works with UC Berkeley and others in the *Vital Signs* program to integrate physical building performance issues into architecture school curricula at dozens of universities.
Services Provided to Market Actors:
Energy Centers

	Services Provided to Market Actors							
Market Actor	Information, Advertising, Websites	Training & Tools	Financial Help	Alliances, Labeling, Standards	Demon-stration	Project Assist-ance	3rd-Party Experts	Other:
Building Owners, Operators	Yes	Yes			Yes	Yes	Yes	
Designer/Specifier	Yes	Yes			Yes	Yes	Yes	
Builders	Yes	Yes			Yes	Yes	Yes	
Contractors	Yes	Yes			Yes	Yes	Yes	
Lending Agents								
ESCOs	Yes				Yes	Yes		

C. Indicators of Program Performance

Energy or Value Indicators: No information is available.
Market Indicators: In an Energy Center Market Effects study, TecMRKT Works found that the PEC is transforming markets. Specifically, the report found that the Energy Center is reaching its targeted market (30,000 users since 1991) in its key market segments (architects, lighting designers, and engineers). According to the study, the behavior of lighting designers is most heavily affected by the Center (79% of survey respondents indicate that they are specifying more efficient equipment), with architects and HVAC system designers influenced to a lesser extent. PG&E reports in its second quarter filing that the architectural community is increasing the use of design tools and these tools are influencing final building designs.
Program Activity Indicators: In its second quarter filing, PG&E reported the following:

- Approximately 100 people per day at Center, including 11,750 program or events-related visits, 120 Tool Loans, and 150 consultations (does not include phone consultations).
- 71 educational programs were presented during the first five months including 25 scheduled programs and 46 customized educational programs for facility managers,

colleges and universities and professional association affiliated programs (e.g., IES, ASHRAE and AIA).

- Educational programs had average attendance during the first six months while design tool use, tool lending, and library use were well above average.
- Facility managers for existing building showed a drop in attendance while architects and ESCO clients rose dramatically.
- Enhancements in the PEC customer/user database were developed and most implemented. Plans for linking energy center information systems began in late May and will be completed by October 1. Actual statewide implementation of the information systems will require new equipment and software once/if centers are formally linked.
- Tool Lending Library enhancements included the 90% completion of new software routines for collecting measured field data from existing buildings. Most routines will be operational by July 1. Tool Lending Library potential savings estimates began during first quarter and analysis of past year's transactions began in mid-June to determine savings potential of the program. Results of study will be done in early September.

D. Program Assessment Information

Evaluation of Assumptions: Building owners/operators and energy professionals can be surveyed to determine the changes in their decisions and practices as a result of Energy Center training and information.

Support for Market Transformation: Growing numbers of participants in Energy Center activities could indicate growth in the competitive market for energy efficient designs and information on energy efficiency. However, increased participation may be due to other market transformation activities.

Conditions for Altering or Withdrawing Program: Centers will continue to serve a purpose as long as there are no other groups providing the same services. If a private consulting group or an educational institution were to provide the same or similar services, the need for PGC-supported centers would need to be assessed. Assessments of competing facilities would not only include services provided, but also such factors as cost and willingness to remain on the cutting edge.

References:

Pacific Gas & Electric Company. *Application of Pacific Gas and Electric Company for Approval of 1998 Energy Efficiency Program, Shareholder Incentive Mechanism for 1998 Programs, a Cost Accounting Process for Transfer of Surcharge Funds, and Update of Energy Efficiency Commitments,* San Francisco, CA, 1997.

Pacific Gas & Electric Company. *1998 Customer Energy Efficiency Programs, Advice Filing 2086-G/1776-E, Attachments.* San Francisco, CA. June 1998.

Pacific Gas & Electric Company. *PG&E Second Quarter Status Report.* San Francisco, CA. July, 1998.

Northwest Energy Efficiency Alliance. *Lighting Design Lab*. URL:http://www.nwalliance.org. 1998.

TecMRKT. *PG&E Energy Center Market Effects Study*, Arlington, VA. 1998.

Title 24 Enforcement Education Program

A. Program Description and Objectives

Program Administrator Area: New construction
Program Budget: Not available. 3rd-Party and Out-of-State Programs.
Program Reporting Category: Nonresidential and Residential New Construction
Program Commitment: Single year
Program Description and Market Transformation Plan: The Title 24 Enforcement Training Program provides education and training to building inspectors located in rural areas of California. Education and training is typically only available in large metropolitan areas.

The market transformation plan is to improve enforcement of Title 24 energy efficiency building codes. This type of enforcement cannot be carried out unless building inspectors are knowledgeable about current energy efficiency technologies and practices. If codes are not enforced, the efficiency opportunities inherent in new construction are often not realized. In the long-term, it is expected that the increased rural building inspector professional development will become institutionalized and ultimately a standard offering of the state itself and/or under contract to a self-supporting private sector organization.
Program Implementers and Affiliates: Consultants (this is a third-party program supported by SoCal Gas)
Customer/Building Type: Customers: residential and commercial; Building Types: all buildings covered by Title 24
Energy End Uses: HVAC, lighting, water heating
End Use Technologies, Services, Practices: Insulation, windows, furnaces, air conditioners, water heaters
Customer Geographic Area: CEC climate zones 1, 2, 14, 15, and 16

B. Market Transformation Characteristics

Market Event: Primary: new construction; secondary: retrofits involving Title 24
Market Barriers Addressed: Organizational practices or customs
Market Barriers Not Addressed: Performance uncertainties, information or search costs, hassle or transaction costs, asymmetric information or opportunism, bounded rationality, access to or understanding of financing, misplaced or split incentives, inseparability of product features, and service or product unavailability
How is the market changing (if at all)? Interviews conducted with rural building inspectors indicate that those jurisdictions are not able to perform inspections adequately without training. Specifically, rural building inspectors interviewed felt that they were not familiar enough with energy efficient technologies to be able to determine what systems meet standards and which do not.
Other Marketing Activities In or Outside of California: The Energy Center of Wisconsin (ECW) is considering a Building Code Inspector Training Program involving computer- and web-based training for design professionals. The City of Santa Monica, a community of 53,000, implemented an effective enforcement program that boosted compliance with energy standards from 5% to 95% within seven years. The program is successful because of the strong commitment from city management. This commitment resulted in increased staff services to builders and designers, including training, distribution of information sheets and individualized instruction. A

plan check engineer works closely with the field inspectors, highlighting areas on plans that are unusual or require special attention. The city estimates that complete compliance in a house will save $4,000 in utility bill costs over 10 years (CEC, 1993).

Services Provided to Market Actors:
Title 24 Enforcement Training Program

	Services Provided to Market Actors							
Market Actor	Information, Advertising, Websites	Training & Tools	Financial Help	Alliances, Labeling, Standards	Demon-stration	Project Assist-ance	3rd-Party Experts	Other:
Building Owners, Operators								
Designer/Specifier								
Builders								
Contractors								
Lending Agents								
Other: Building Inspectors, Local Government		Yes						

C. Indicators of Program Performance

Energy or Value Indicators: Not available.
Market Indicators: Not available
Program Activity Indicators: Deliverables include development of curriculum, development of a class schedule, evaluation reports, class rosters, and a training calendar for follow up requests.

D. Program Assessment Information

Evaluation of Assumptions: A fundamental assumption is that there is a need for such a program. To answer this question, a needs assessment was conducted in 1997 at California Building Officials Education Week seminars.
Support for Market Transformation: Ordinarily, a program would be judged by comparing baseline compliance with post-program compliance. In this case, the problem is that buildings that do not pass Title 24 are being recorded as complying. As such, a study of changes in compliance levels will be inconclusive. Another way to measure the transformation of the market is to conduct follow-up studies to determine the degree to which building inspectors begin to work with builders to change building practices such that compliance with Title 24 increases.
Conditions for Altering or Withdrawing Program: If attendance at training classes is low, the program should be redesigned in such a way as to increase attendance. The program can be withdrawn when rural jurisdictions have built up internal expertise in energy code compliance.

References:

California Energy Commission. *Energy Aware Planning Guide*. January 1993.

Energy Center of Wisconsin. *Building Code Inspector Training Program*. URL:http://www.ecw.org. 1998.

Southern California Gas Company. *Request for Proposals - Third Party Market Transformation Programs - California Energy Efficiency Enforcement Training Proposal*. Los Angeles, CA. 1997.

Southern California Gas Company. *Second Quarter Program Review*. Los Angeles, CA. July 1998.

Standards and Protocols Program

A. Program Overview

Program Administrator Area: New construction
Program Budget: PY98 California PGC DSM Budget $240,000 for PG&E program. Budget not provided for SoCal Gas 3rd-Party Program. This category includes new utility, 3rd-party, and out-of-state programs.
Program Reporting Category: Nonresidential new construction
Program Commitment: Multi-year
Program Description and Market Transformation Plan: The program includes two distinct strategies. The first involves working with the California Energy Commission and the Federal Government to alter existing state, and Federal energy standards. The second develops a set of voluntary guidelines to be used by the design community. This regulatory-based effort is aimed at a large proportion of the building industry that uses a minimum first cost strategy to compete in the marketplace. Improving standards remains the only cost-effective approach to "raising the bar" for "low end" builders and designers.

The market transformation plan involves the development of design standards to assist the design community in making energy efficient design decisions. Working at the local, state, and Federal level allows for a broad geographic impact. Development of voluntary guidelines provides interested designers with the means to take additional steps towards energy efficient design beyond the minimum required. Once the standards take effect, utility support can be withdrawn, and the market effects will continue.
Program Implementers and Affiliates: Consultants, utility staff, state and local government
Customer/Building Type: All commercial and residential
Energy End Uses: All, but primary focus on space heating and cooling
End Use Technologies, Services, Practices: Boilers, condensing boilers, water heaters, double effect absorption chillers, R-19 ceiling insulation, A/C - engine driven, flue heat retriever
Customer Geographic Area: All CEC climate zones

B. Market Transformation Characteristics

Market Event: Primary: new construction; secondary: retrofit involving Title 24
Market Barriers Addressed: Organizational practices or customs
Market Barriers Not Addressed: Performance uncertainties, information or search costs, hassle or transaction costs, asymmetric information or opportunism, bounded rationality, access to or understanding of financing, misplaced or split incentives, inseparability of product features, service or product unavailability
How has the market changed (if at all)? Standards are updated periodically.
Other Market Transformation Activities In or Outside of California: The Northeast Energy Efficiency Partnership (NEEP) *Enhanced Building Energy Code Standards and Implementation* partners with DOE and other market actors in the Northeast to promote standard development for energy efficient buildings through the use of software tools, training, and involvement in standard setting processes. The *NEEA New Construction Project* (formerly Northwest Building Practices) has three primary elements: (1) mass media marketing campaigns designed to increase consumer and builder awareness of energy efficient new construction practices, (2) a regional stakeholders committee called the New Construction Council (NCC) representing both government and the

building industry to provide advice on designing and funding these programs, and exploring regional coordination, and (3) strategies are designed to foster cost-efficient residential and commercial energy codes and compliance throughout the region.

Services Provided to Market Actors:

Standards and Protocols Program

Market Actor	Services Provided to Market Actors							
	Information, Advertising, Websites	Training & Tools	Financial Help	Alliances, Labeling, Standards	Demon-stration	Project Assist-ance	3rd-Party Experts	Other:
Building Owners, Operators				Yes				
Designer/Specifier				Yes				
Builders								
Contractors								
Lending Agents								
Other: CEC, Federal Gov't.				New Energy Standards				

C. Indicators of Program Performance

Energy or Value Indicators: No cost-effectiveness information was provided. However, the new construction and gut rehab market impacted by standards is large. Since standards development is a relatively low cost strategy and has proven effective in the past, the program is expected to be cost-effective. Several concrete examples of how standards and protocols impact energy use at the local level are available from Global Cities Project case studies:

- A planner from the City of Visalia, CA, found that reduced street widths had several effects, including a 10-15 degree Fahrenheit reduction in ambient air temperature in the hottest parts of the county.
- Despite a growing population, the City of Davis local energy code project reduced total energy use in the City by 30 percent since 1973. Studies have demonstrated that citizens support these measures and the code has been expanded and strengthened.
- San Francisco enacted a Residential Energy Conservation Ordinance (RECO) which required residential property owners to provide certain energy and water conservation measures for their buildings prior to any sale or major improvement. The original ordinance was amended in 1983 and 1991 to include stricter building insulation and water conservation measures. Within the first four and a half years, over 24,000 units were retrofitted, representing approximately 18 percent of the housing stock. Projected savings from this program were six million dollars.

Market Indicators: Not available.

Program Activity Indicators: Deliverables and milestones include the following: 1) agreements with the CEC regarding intent to improve standards, 2) completion of a contract with a facilitator who will handle the process of developing technical documentation in support of the standards review process, 3) workshops to begin the process of changing the standards (Energy Standards), and 4) drafts and final reports of protocol-setting workshops and research efforts (Design Guidelines). As of the second quarter filing, SoCal Gas's program is proceeding with these deliverables on schedule. Also as of June, 1998, PG&E had signed a contract with the California Energy Commission to begin work on dollar-based performance standards.

D. Program Assessment Information

Evaluation of Assumptions: Tracking the building standards development process at the state and national level will provide an indication of success. The California Energy Commission (CEC) and DOE evaluate building and appliance standards on a biannual basis. Professional organizations such as ASHRAE and CABO have technical committees that evaluate standards and protocols. These organizations will provide information and indications of success.
Support for Market Transformation: Success will be measured by the degree to which new standards and protocols are affected by the various market transformation efforts covered by this program. If the program is successful, the standards and protocols released will reflect the energy efficiency priorities supported by the program implementers. This "push-pull" strategy for setting new energy standards has been effective at transforming markets in the past. The EPAct of 1992, ASHRAE 90, and Title 24 are all based on technologies that used to be receive incentives and are now required equipment.

Conditions for Altering or Withdrawing Program: The programs are an ongoing effort to insure broad adoption of basic energy efficiency measures and approaches.

References:

Global Cities Project. *Case Studies on Energy Efficiency*. www.globalcities.org. 1998.

Northeast Energy Efficiency Partnership, *1997 Annual Report: Forming Alliances and Transforming Markets*, Lexington, MA, 1998.

Northwest Energy Efficiency Alliance. *New Construction Project*. URL:http://www.nwalliance.org. 1998.

Pacific Gas & Electric Company. *Application of Pacific Gas and Electric Company for Approval of 1998 Energy Efficiency Program, Shareholder Incentive Mechanism for 1998 Programs, a Cost Accounting Process for Transfer of Surcharge Funds, and Update of Energy Efficiency Commitments.* San Francisco, CA. October 1997.

Pacific Gas & Electric Company. *1998 Customer Energy Efficiency Programs, Advice Filing 2086-G/1776-E, Attachments.* San Francisco, CA, June 1998.

Pacific Gas & Electric Company. *PG&E Second Quarter Status Report.* San Francisco, CA. July, 1998.

Pacific Gas and Electric Company. William Miller and Pat Eilert. "PG&E Energy Efficiency Program Supplemental Information." San Francisco, CA August 1998.

SoCal Gas, *Third Party Proposals - Improving Commercial/Industrial New Construction Energy Efficiency Through Design Guidelines - Statement of Work*, Los Angeles, CA, 1998.

Southern California Gas Company. *Second Quarter Program Review*. Los Angeles, CA. July 1998.

Residential Marketing/Incentives Program

A. Program[62] Description and Objectives

Program Administrator Area: New Construction
Program Budget: PY98 California PGC DSM Budget $9.5 million. Budget information for SCE, SDG&E and SoCal Gas 3rd-Party programs not provided. This category consists primarily of existing utility programs.
Program Reporting Category: Residential New Construction, Residential Information
Program Commitment: Multi-year
Program Description and Market Transformation Plan: The Residential Marketing/Incentives (RMI) Program provides marketing support and (in PG&E territory only) cash incentives to production home builders that design and build homes whose energy efficiency exceeds that required by Title 24.

The market transformation plan has three elements: (1) build consumer awareness of the long-term benefits of energy-efficient homes; (2) encourage builders to use energy efficiency and branding (e.g., EPA Energy Star, PG&E Comfort Home, or SoCal Gas Energy Advantage Home) to differentiate their homes on the market; (3) and promote the use of Home Energy Ratings (HERs) and Energy Efficiency Mortgages. Eventually, it is hoped production homebuyers will recognize the value of energy efficiency and be willing to pay more for homes with such features or trade off other features for added energy efficiency and access to EEM financing. On the supply side, it is hoped that production homebuilders will come to recognize the added marketing value and profitability of energy-efficient homes.
Program Implementers and Affiliates: Utility staff, third-party consultants, EPA (Energy Star New Homes), and builders.
Customer/Building Type: Residential single family and (in SoCal Gas and PG&E territory) multi-family
Energy End Uses: All, but with emphasis on HVAC, windows, water heating, appliances
End-Use Technologies, Services, Practices: All, but with emphasis on efficient central air conditioning, duct sealing, high-performance windows, natural gas cooking, clothes dryers, and water heating
Customer Geographic Area: All, but focus on CEC climate zones 7, 10, 11, 12, 13, 14, and 15.

B. Market Transformation Characteristics

Market Event(s): New construction
Market Barriers Addressed: Organizational practices or customs, performance uncertainties, information or search costs, asymmetric information or opportunism, bounded rationality, access to or understanding of financing, misplaced or split incentives, service or product unavailability
Market Barriers Not Addressed: Inseparability of product features, hassle or transaction costs
How is the market changing (if at all)? Not available
Other Market Transformation Activities In or Outside California: CHEERS Support Program (see Residential Program Summaries).

[62] Note that for 1998 programs, "program" is the *combination* of similar utility-sponsored programs.

Services Provided to Market Actors:
Residential Marketing/Incentives Program

	Services Provided to Market Actors							
Market Actor	Information, Advertising, Websites	Training & Tools	Financial Help	Alliances, Labeling, Standards	Demon-stration	Project Assist-ance	3rd-Party Experts	Other:
Building Owners, Operators	Yes			Yes				
Designer/Specifier								
Builders	Yes	Duct training	Incentives	Yes				
Contractors								
Lending Agents		Yes						
Other: Realtors		Sales Training						

C. Indicators of Program Performance

Energy or Value Indicators: 5.4 GWh and 117,000 therms based on utility projection of past program performance and M&E studies; 15 year "program-weighted" measure lifetime. The PG&E Comfort Home has a TRC of 1.07 and is the only program for which data are available.
Market Indicators: A market transformation study of SCE's Welcome Home (1990-1994) and PG&E's Comfort Home (1992-1996) programs found that these programs were somewhat successful at increasing awareness of energy efficiency, attracting builder-participants, and increasing the stock of homes built to exceed Title 24. The study showed evidence of some level of reduction (although in most cases, slight) in the information-related barriers of home buyers, builders sales agents and realtors, and builders (having to do with contractor selection), and in the HVAC subcontractor barrier of poor ductwork installation practices. The study also shows evidence of limited reduction in what the study authors believe to be the main barrier in the residential new construction market: builder split incentives (Barakat and Chamberlin, 1997, pp. vi). Note: Program offerings have changed and thus this market effects study is not fully representative of the new program designs.

A recently completed market effects study of residential new construction programs in Southern California (RER, 1998) concluded that although there is some evidence of partial market transformation attributable to the programs, the overall transformation effects of the programs appear to have been minimal. The study reports, "While builders (and probably HVAC contractors) exhibit some potentially long-lasting changes in behavior as a result of participation in these programs, other actors do not seem to have been influenced in any significant way. The most significant and notable permanent effects attributed to the programs pertained to duct sealing practices" (RER, 1998, pp. ES-16)
Program Activity Indicators: SoCal Gas' Energy Advantage Home program had 12,000 units meet program requirements between January and June, 1998 (compared to 25,000 for all of 1997). They report a successful transition from working primarily with the construction and purchasing agent groups within builders' organizations to working with marketing groups.

The SG&E Third-Party ComfortWise program was "in field" by April, 1998. As of June, 1998, ConSol had submitted a baseline assessment study and begun marketing to builders. In SCE territory, plans submitted by ten large builders were undergoing analysis for the ComfortWise program in June, 1998. Training sessions had been held with builders and promotional items were being prepared for use once builders agree to participate in the program.

No information is available about ConSol's activities in SoCalGas territory.

As of July, 1998, PG&E's reported 2,014 units had signed up in the Comfort Home Program (representing 40% of their goal for 1998). They had also developed all collateral materials, held three builder kick-off meetings, and completed various promotional activities. PG&E also worked closely with California Home Energy Efficiency Rating System (CHEERS) representatives to establish reference houses to meet rating requirement of PG&E Comfort Home Plus/Energy Star New Homes Program.

D. Program Assessment Information

Evaluation of Assumptions: Not available

Support for Market Transformation: Residential Marketing/Incentives program success could be measured by: 1) evaluating penetration rates for products promoted through the program; 2) tracking the number of builders signed up for EPA's Energy Star New Homes program; 3) assessing energy efficiency awareness of the various market actors; 4) tracking changes in efficiency standards (Title 24); 5) tracking changes in incremental costs for new technologies promoted by the program; and 6) tracking market share of energy-efficient new homes (homes that exceed Title 24 requirements).

Conditions for Altering or Withdrawing Program: Utility involvement over time could be greatly reduced as the industry learns to use the benefits from energy efficiency as a sales advantage. The realization of greater profits and sales from energy-efficient construction will transform the market from being antagonistic to additional improvements in energy efficiency to a market that supports increased energy efficiency.

References:

Barakat and Chamberlin. *Residential New Construction: Market Transformation Study*. 1997.

Pacific Gas and Electric Company. *Application of Pacific Gas and Electric Company for Approval of 1998 Energy Efficiency Programs, Shareholder Incentive Mechanism for 1998 Programs, as Cost Accounting Process for Transfer of Surcharge Funds, and Update of Energy Efficiency Commitments*. San Francisco, CA. October 1997.

Pacific Gas & Electric Company. *1998 Customer Energy Efficiency Programs. Advice Filing 2086-G/1776-E. Attachments.* San Francisco, CA. June 1998.

Pacific Gas & Electric Company. *PG&E Second Quarter Status Report.* San Francisco, CA. July, 1998.

Pacific Gas and Electric Company. William Miller and Cecelia Barros. "PG&E Energy Efficiency Program Supplemental Information." San Francisco, CA August 1998.

RER. *Residential Market Effects Study*. San Diego, CA. June, 1998.

San Diego Gas and Electric Company. *Testimony of Yolanda A. Whiting Before the Public Utilities Commission of the State of California.* October 1997.

San Diego Gas and Electric Company. *Third Party Initiatives Program Provider - Administrator Agreement, Agreement Number: TPIP-003*. (ConSol ComfortWise) San Diego, CA. 1998.

San Diego Gas and Electric Company. *Advice 1104-E/1100-G, 1998 Energy Efficiency Program Plans and Budgets*. San Diego, CA. June 1998.

Southern California Edison Company. *Appendix B to the Testimony of Southern California Edison in Support of the 1998 DSM Program Funding*. Rosemead, CA. October 1997

Southern California Edison Company. *1998 Energy Efficiency Programs, Quarterly Report Second Quarter*. Rosemead, CA. July 1998.

Southern California Gas Company. *Application of Southern California Gas Company*. Los Angeles, CA. October 1997.

Southern California Gas Company, *1998 Energy Efficiency Program Plans and Budgets*. Los Angeles, CA. June 1998.

Southern California Gas Company. *Second Quarter Program Review*. Los Angeles, CA. July 1998.

The Gas Company. *Advice No. 2719.* Los Angeles, CA. June 1998.

Nonresidential Incentives/Marketing Program

A. Program Description and Objectives

Program Administrator Area: New Construction
Program Budget: PY98 California PGC DSM Budget $6.05 million (Existing Utility Program)
Program Reporting Category: Nonresidential New Construction, Nonresidential Information
Program Commitment: Single year
Program Description and Objectives: The Nonresidential Incentives/Marketing (NIM) Program provides incentives and technical assistance to architects and engineers as well as building owners. System incentive levels are structured to offset a portion of the incremental cost of installing higher efficiency products and equipment. Since this element of the program promotes energy efficient systems, it is something that is best incorporated in the early stages of design. Thus, a Design Analysis element offers technical assistance and resources to design teams involved in the design of commercial and industrial buildings. The NIM Program is designed to encourage the incorporation of energy efficient technologies into the design of commercial projects by (1) assisting architects and engineers with the design of energy-efficient nonresidential new construction or tenant improvement projects, (2) creating awareness of cost-effective commercial energy efficiency options within the architectural and building owner communities, and (3) offering incentives to building owners/developers to encourage the installation of energy-efficient equipment which exceeds Title 24 standards.

The market transformation plan is to impact the new construction market by providing technical assistance and financial incentives to building designers and building owners early in the design stage of new buildings. In the short run, this helps encourage designers and building owners to invest time and money into energy efficient design. In the long run, these practices will become better known and more widely accepted in the design/build community, making the market effects more sustainable.
Program Implementers Affiliates: Utility staff
Customer/Building Type: All commercial, all sizes
Energy End Uses: All
End Use Technologies, Services, Practices: No particular technologies listed
Customer Geographic Area: Southern California

B. Market Transformation Characteristics

Market Event: Primary: new construction; secondary: major retrofits involving Title 24
Market Barriers Addressed: Organizational practices or customs, information or search costs, hassle or transaction costs, bounded rationality, misplaced or split incentives
Market Barriers Not Addressed: Performance uncertainties, asymmetric information or opportunism, access to or understanding of financing, inseparability of product features, and service or product unavailability
How is the market changing (if at all)? Currently, nearly every major player in the San Diego development market is participating in the program, indicating a high level of change in that area.
Other Market Transformation Activities In or Outside of California: None identified

Services Provided to Market Actors:
Nonresidential Incentives/Marketing Program

	Services Provided to Market Actors							
Market Actor	Information, Advertising, Websites	Training & Tools	Financial Help	Alliances, Labeling, Standards	Demon-stration	Project Assist-ance	3rd-Party Experts	Other:
Building Owners, Operators	Yes		Incentives			Yes	Yes	
Designer/Specifier								
Builders								
Contractors								
Lending Agents								
Other:								

C. Indicators of Program Performance

Energy or Value Indicators: 27.9 GWh and 547,000 therms based on utility projection of past program performance and M&E studies; 15 year program-weighted measure lifetime. TRC tests were available for both programs within this program group. Cost effectiveness as suggested by these TRC tests ranges from 1.82 (SDG&E Savings Through Design) to 2.42 (SCE Incentive Program). The program-budget-weighted average TRC is 2.15.

Market Indicators: Although no official reports are available, SDG&E reports in its second filing that architects and engineers are seeking out assistance on an increasing number of projects; marketing representatives are making more presentations to building owners; and opportunities for educating building owners and developers considering new buildings are expanding.

Program Activity Indicators: Through May 31, 1998, SDG&E's Savings Through Design program reported over 170 potential projects identified and being tracked; 123 contract agreements created and offered to building owners with 65 agreements having been accepted and signed; 14 projects completed, inspected, and incentive checks issued. Examples of the types of projects completed include the installation of lighting, package air conditioning, heat pumps, chillers, and variable speed drives. To promote the program, SDG&E had participated in several building industry events including: the American Society of Heating, Refrigeration, and Air Conditioning Engineers San Diego Trade Show and the California Resource Recovery Conference. Program collateral and case study/testimonials have been produced and distributed.

As of July, 1998, SCE had developed the Nonresidential New Construction Incentive program and accompanying promotional materials. The program had nearly $1.000 million in commitments associated with energy efficiency equipment, which represented approximately 16,500 MWh in annualized energy savings.

D. Program Assessment Information

Evaluation of Assumptions: The program relies on the assumption that technical assistance is not currently available or too expensive for architects and engineers to hire or provide themselves. These assumptions can be tested or evaluated through surveying architects, engineers and builders.

Support for Market Transformation: Building owners will learn that they can achieve lower operating costs through the use of energy efficiency, leading to lower total costs for a new construction project. Builders and developers will find that energy-efficiency will enhance the

marketability of their buildings. Eventually the builders and developers who promote energy-efficient designs will achieve a competitive advantage in the marketplace. Their competitors will find it necessary to offer energy-efficient buildings or they will lose business opportunities. Thus, energy-efficient design will become standard practice in new construction.

Conditions for Altering or Withdrawing Program: If the program does indeed become self-sustaining (that is, if market pressures begin to induce designers to incorporate energy efficiency even without incentives), then the program can be discontinued. This should be reassessed each year.

References:

San Diego Gas and Electric Company. *Testimony of Yolanda A. Whiting Before the Public Utilities Commission of the State of California*. San Diego, CA. October 1997.

San Diego Gas and Electric Company. *Advice 1104-E/1100-G, 1998 Energy Efficiency Program Plans and Budgets*. San Diego, CA. June 1998.

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Southern California Edison Company. *Extension of 1998 Energy Efficiency Program Plans and Performance Award Mechanisms.* Rosemead, CA. June 1998.

Southern California Edison. *1998 Energy Efficiency Programs Quarterly Report, Second Quarter*. Rosemead, CA. July 1998.

Residential Design Assistance

A. Program[63] Description and Objectives

Program Administrator Area: New Construction
Program Budget: PY98 California PGC DSM Budget $350,000 (New PY98 Utility Program)
Program Reporting Category: Residential New Construction
Program Commitment: Single year
Program Description and Market Transformation Plan: The Residential Design Assistance (RDA) Program offers free design reviews either before or shortly after design drawings have been completed. These reviews determine whether the design meets utility program requirements and EPA Energy Star Home Program requirements. The program also educates builders about energy-efficient fluorescent lighting fixtures for the home and provides informational brochures to prospective homebuyers.

The market transformation plan is to fill a gap in services offered by design professionals (i.e., consideration of energy-efficient options) for current projects. This service is expected to impact future projects by educating homebuilders and buyers. Eventually, equipment suppliers and vendors are expected to carry more energy-efficient equipment in their inventories to support increased demand. The degree to which this is achieved will determine the program's sustainability.
Program Implementers and Affiliates: Utility staff, custom and production home builders
Customer/Building Type: Single family homes
Energy End Uses: All, but focus on lighting
End-Use Technologies, Services, Practices: All, but focus on fluorescent fixtures designed for residential applications
Customer Geographic Area: All

B. Market Transformation Characteristics

Market Event(s): New construction
Market Barriers Addressed: Information or search costs, hassle or transaction costs, organizational practices or customs, performance uncertainties
Market Barriers Not Addressed: Misplaced or split incentives, inseparability of product features, and service or product unavailability
How is the market changing (if at all)? Not available
Other Market Transformation Activities In or Outside California: None identified

[63] Note that for 1998 programs, "program" is the *combination* of similar utility-sponsored programs.

Services Provided to Market Actors:
Residential Design Assistance Program

	Services Provided to Market Actors							
Market Actor	Information, Advertising, Websites	Training & Tools	Financial Help	Alliances, Labeling, Standards	Demon-stration	Project Assist-ance	3rd-Party Experts	Other: Design Review
Building Owners, Operators	Yes							Yes
Designer/Specifier								Provide
Builders	Yes							Yes
Contractors								
Lending Agents								
Others								

C. Indicators of Program Performance

Energy or Value Indicators: Not available.
Market Indicators: No formal studies of market indicators are available, but SDG&E reports in its Second Quarter update to the CPUC that many projects being reviewed are planned and designed to only meet state energy codes and current minimum performance levels. Commonly available, market-proven, high efficiency systems are still seen by many design teams as not feasible due to the high first costs. Efforts to persuade builders and developers of the long-term cost savings resulting from the incorporation of energy efficiency technologies which exceed Title 24 standards represents an area in which work needs to continue.
Program Activity Indicators: As of June, 1998, SDG&E had issued a request for proposal (RFP) to three firms seeking the services of a Title 24 consultant to perform design evaluations. Responses were to be returned and a firm selected and in place shortly thereafter. Builder participation agreements had been produced and follow-up calls have been made. According to SDG&E, designers participating in the program are incorporating energy-efficient technologies into their project plans.

D. Program Assessment Information

Evaluation of Assumptions: Not available
Support for Market Transformation: Not available
Conditions for Altering or Withdrawing Program: To be able to maintain a level of sustainability, designers will need to have more information about energy efficiency to achieve compliance with planned changes in state regulations.

References:

San Diego Gas and Electric Company. *Testimony of Yolanda A. Whiting Before the Public Utilities Commission of the State of California*. San Diego, CA. October 1997.

San Diego Gas and Electric Company. *Advice 1104-E/1100-G 1998 Energy Efficiency Program Plans and Budgets*. San Diego, CA. June 1998.

San Diego Gas and Electric Company. *1998 Second Quarter Program Status Update*. San Diego, CA. July 1998.

Nonresidential Design Assistance

A. Program[64] Description and Objectives

Program Administrator Area: New Construction
Program Budget: PY98 California PGC DSM Budget $4.7 million. This category consists primarily of existing utility programs.
Program Reporting Category: Nonresidential New Construction
Program Commitment: Single year
Program Description and Objectives: The Nonresidential Design Assistance (NDA) Program provides architects and builders with project-specific energy efficiency information and services early on in the building or manufacturing design process. Services include design review and recommendations, simulation and modeling, financial analysis, efficiency recommendations, energy benchmarking and design awards. The NDA Program also provides a mechanism for information exchange and discussion among designers, vendors, and regulators.

The market transformation plan of the NDA Program is to first increase awareness and knowledge of energy efficiency options and benefits within the design community. With added tools and expertise, design firms will be able to change their organizational practices so that designers are rewarded for investigating and pursuing energy-efficient building design or manufacturing process options. This, in turn will result in improved compliance with state building energy codes and eventual code enhancement as a result of successful implementation of integrated energy-efficient building design.
Program Implementers and Affiliates: Consultants, utility staff
Customer/Building Type: All commercial and industrial, but focused on larger customers
Energy End Uses: All
End-Uses Technologies, Services, Practices: All
Customer Geographic Area: All CEC climate zones

B. Market Transformation Characteristics

Market Event: New construction
Market Barriers Addressed: Organizational practices or customs, misplaced or split incentives, asymmetric information, information/search costs, hassle/transaction costs
Market Barriers Not Addressed: Bounded rationality, inseparability of product features, product or service availability, externalities
How is the market changing (if at all)? Not available
Other Market Transformation Activities In or Outside California: The Northwest Energy Efficiency Alliance (NEEA) *Architecture + Energy: Building Excellence in the Northwest* awards program provides regional workshops and other educational efforts. NEEA's project informs designers of commercial buildings about the value and benefits of energy-efficient architecture. NEEA also runs *Northwest Lighting On-line*, offering Internet access to lighting design resources, primarily for lighting specifiers and contractors. The Energy Center of Wisconsin (ECW) *Green Commercial Buildings Program* will provide design assistance and commissioning for a group of buildings on the University Research Park campus. The ECW *Daylighting Collaborative* aims to

[64] Note that for 1998 programs, "program" is the *combination* of similar utility-sponsored programs.

increase daylighting as a design element in renovation and new construction of commercial buildings through collaborating with regional and national organizations and utilities.

Services Provided to Market Actors:

Nonresidential Design Assistance Program

Market Actor	Services Provided to Market Actors							
	Information, Advertising, Websites	Training & Tools	Financial Help	Alliances, Labeling, Standards	Demon-stration	Project Assist-ance	3rd-Party Experts	Other: Design Review, Finance Analysis
Building Owners, Operators								
Designer/Specifier								Provide
Builders	Design Assistance		Yes					
Contractors								
Lending Agents								
Other:								

C. Indicators of Program Performance

Energy or Value Indicators: Projected 1st year savings are 7.1 GWh and 2.4 MW (based on utility projections from past M&E); 15 year program-weighted measure lifetime. TRC tests were available for two out of three programs within this program group. Cost effectiveness as suggested by these TRC tests ranges from 1.67 (PG&E Design Assistance) to 2.93 (SoCal Gas Commercial EMS). The program-budget-weighted average TRC is 2.36.

Market Indicators: Although no market effects studies are available, PG&E reports in its second quarter filing that the end of many incentive programs in 1997 brought about a market perception that utilities were no longer offering energy efficiency programs. This break in continuity has resulted in unexpectedly low activity to date. Recent marketing efforts have increased awareness of the Design Assistance program and the response is encouraging. Clients who previously participated in the incentive programs have responded favorably to the availability of energy efficiency services provided through the program. Project activity is expected to increase in the third quarter.

Program Activity Indicators: SDG&E's Nonresidential Energy Design Assistance program was operational January 1, 1998 and as of mid-May, 33 projects had been reviewed and recommendations provided to the project design teams. Program advertising was also placed in trade newsletters and newspaper supplements. In addition, PG&E's Design Assistance program held four seminars and two workshops, made more than 100 market contacts, and identified fifteen case study opportunities. No other program activity information is available.

D. Program Assessment Information

Evaluation of Assumptions: Not available

Support for Market Transformation: One current Administrator (PG&E) suggests that increased use of advanced design tools, early adoption of new energy standards, creation of "reach" standards, and increased use of utility energy centers would indicate market effects from the Nonresidential Design Assistance program. No information is provided regarding how such data would be defined and collected.

Conditions for Altering or Withdrawing Program: When changes in design practice allow for inclusion of energy-efficiency integrated design, when project specifications reflect increased energy awareness, when the customer understands and incorporates energy efficiency as standard practice, and when energy codes are enhanced, the NDA Program can be withdrawn.

References:

Pacific Gas and Electric Company. *Application of Pacific Gas and Electric Company for Approval of 1998 Energy Efficiency Programs, Shareholder Incentive Mechanism for 1998 Programs, as Cost Accounting Process for Transfer of Surcharge Funds, and Update of Energy Efficiency Commitments*. San Francisco, CA. October 1997.

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Energy Center of Wisconsin. *Green Commercial Buildings Program*. URL:http://www.ecw.org. 1998.

Energy Center of Wisconsin. *Daylighting Collaborative*. URL:http://www.ecw.org. 1998.

Northwest Energy Efficiency Alliance. *Architecture + Energy: Building Excellence in the Northwest*. URL:http://www.nwalliance.org. 1998.

Northwest Energy Efficiency Alliance. *Northwest Lighting On-line*. URL:http://www.nwalliance.org. 1998.

Residential/Small Commercial Demonstration Program

A. Program[65] Description and Objectives

Program Administrator Area: New Construction
Program Reporting Category: Residential and Nonresidential New Construction, Other
Program Budget: PY98 California PGC DSM Budget $3.1 million. The budget for the SCE High Efficiency Air Conditioning Showcase Program is not available. This category consists primarily of new PY98 utility programs.
Program Commitment: Multi-year
Program Description and Market Transformation Plan: The Residential/Small Commercial Demonstration Program provides funding for emerging technology installations at actual customer sites. In some cases, the customer or equipment manufacturer is provided a cash incentive to participate. Installations are followed by site tours, case studies, and monitoring to document equipment performance. The program also funds market assessments, feasibility studies, and training.

The market transformation plan is to provide the data and real-world experience customers need to be confident that a new technology works and offers the performance and results claimed for it, as well as to identify promising technologies for later promotion through mass-market incentive programs or other channels. Sustainability is gauged by the ability of the technologies to stand on their own after a period of support.

Data generated by the Residential/Small Commercial Demonstration Program sites will make it easier for the target audience to acquire information about new energy-efficient technologies and gain a better understanding of the benefits provided by energy-efficient building practices. This will help overcome "business-as-usual" design practices that continue the use of outdated technologies. It is thought that once customers see the advantages of particular new technologies, procedures, or designs, they will be more likely to adopt them as standard practice for their organizations.

Program Implementers and Affiliates: Utility staff, vendors, equipment manufacturers
Customer/Building Type: Customers: Residential, small commercial (and some large commercial); Buildings: Residential, small commercial (and some large commercial such as hospitals, laboratories, high-tech and bio-tech facilities
Energy End Uses: Space heating, space cooling, water heating, cooking, process, other
Energy End Uses/Technologies: All, but targets geothermal and air-source heat pumps, evaporative coolers, high efficiency air conditioning, low water/energy dishwashers, furnace blower motors, and domestic water heaters. PG&E's Natural Cooling Program case studies are demonstrating that evaporative cooling, especially indirect evaporative cooling, has a wide application in both retrofit and new construction marketplaces. This includes large-scale buildings with significant outdoor air requirements such as hospitals, laboratories, high tech and bio tech facilities.
Customer Geographic Area: All CEC climate zones

B. Market Transformation Characteristics

Market Event: New construction, retrofit

[65] Note that for 1998 programs, "program" is the *combination* of similar utility-sponsored programs.

Market Barriers Addressed: Performance uncertainties, information or search costs, hassle or transaction costs, asymmetric information or opportunism, service or product unavailability, and organizational practices or customs.
Market Barriers Not Addressed: Bounded rationality, access to or understanding of financing, misplaced or split incentives, inseparability of product features
How is the market changing (if at all)? Although the filings do not provide supporting evidence, the utilities involved believe that the market for these advanced technologies is not moving forward on its own.
Other Market Transformation Activities In or Outside California: The Energy Center of Wisconsin *Heat Pumps Project* looked at seven residential geothermal heat pump applications and one gas-engine air-source heat pump. The purpose was to look at the latest innovations in loop systems and heating/cooling configurations to determine performance in terms of meeting loads, comfort, first cost, and overall economics. The systems will be monitored at least through April 30, 1998, to test the long-term effects on inlet temperatures (ground temperatures in the vicinity of the loop).
Services Provided to Market Actors:
Residential/Small Commercial Demonstration Program

	Services Provided to Market Actors							
Market Actor	Information, Advertising, Websites	Training & Tools	Financial Help	Alliances, Labeling, Standards	Demon-stration	Project Assist-ance	3rd-Party Experts	Other:
Building Owners, Operators	Yes		Incentives		Yes			
Designer/Specifier								
Builders								
Contractors	Yes							
Lending Agents								
ESCOs	Yes				Yes			

C. Indicators of Program Performance

Energy or Value Indicators: Not available
Market Indicators: Although no formal reports are available, in its second quarter filing, PG&E noted a 50% increase in attendance of manufacturers and suppliers at Cool Roof Rating Council meetings.

Program Activity Indicators: PG&E's second quarter filing included the following program activity indicators for the GeoExchange program: 19 units of residential systems installed (200+ units pending), 50,000 square feet of commercial space systems installed (75,000 square feet pending), and four contractor training classes held. Program activities for the Emerging Technologies program included identification of twenty technologies, ten draft preliminary literature review and cost-effectiveness evaluations completed, and administrative support and organizational formation initiated for Cool Roof Rating Council.

D. Program Assessment Information

Evaluation of Assumptions: The underlying assumption of this program is that some customers need to see a product working "in the field" before they are willing to adopt it for their own home or business. This assumption could be tested by surveying demonstration project visitors to see if their willingness to purchase a new technology has changed as a result of participation in the

program.

Support for Market Transformation: Not available.

Conditions for Altering or Withdrawing Program: The program will gradually reduce its support of emerging technologies when the number of field demonstrations and customer installations are adequate to support a stand-alone market. As support for the technologies decreases, the ability of the technologies to stand on their own can be assessed. Even in the absence of such an assessment, the program's success can be judged (and the need for change can be assessed) by other factors such as whether new manufacturers are producing the technology, whether the product is being specified for construction projects, and whether the product is seeing increased success in areas outside of California.

References:

Pacific Gas and Electric Company. *Application of Pacific Gas and Electric Company for Approval of 1998 Energy Efficiency Programs, Shareholder Incentive Mechanism for 1998 Programs, as Cost Accounting Process for Transfer of Surcharge Funds, and Update of Energy Efficiency Commitments*. San Francisco, CA. October 1997.

Pacific Gas & Electric Company. *1998 Customer Energy Efficiency Programs, Advice Filing 2086-G/1776-E, Attachments.* San Francisco, CA. June 1998.

Pacific Gas & Electric Company. *PG&E Second Quarter Status Report.* San Francisco, CA. July, 1998.

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Southern California Edison. *Appendix B to the Testimony of Southern California Edison in Support of the 1998 DSM Program Funding*. Rosemead, CA. October 1997.

Southern California Edison Company. *Extension of 1998 Energy Efficiency Program Plans and Performance Award Mechanisms.* Rosemead, CA. June 1998.

Southern California Edison. *1998 Energy Efficiency Programs Quarterly Report, Second Quarter*. Rosemead, CA. July 1998.

Energy Center of Wisconsin. *Heat Pump Program*. URL:http://www.ecw.org. 1998.

Commercial/Industrial/Agricultural (CIA) Demonstration Program

A. Program[66] Description and Objectives

Program Administrator Area: New Construction
Program Reporting Category: Nonresidential New Construction, Other
Program Budget: PY98 California PGC DSM Budget $6.0 million (Existing Utility Program)
Program Commitment: Multi-year
Program Description and Market Transformation Plan: The CIA Demonstration Program provides funding for emerging technology installations at actual customer sites. In some cases the customer or equipment manufacturer is provided a cash incentive to participate. Installations are followed by site tours, case studies, and monitoring to document equipment performance. The program also funds market assessments, feasibility studies, and training.

The program's market transformation plan is to provide the data and real-world experience customers need to be confident both that a new technology works and that it offers the performance and results claimed for it, as well as to identify promising technologies for later promotion through mass-market incentive programs or other channels.

Demonstration projects implemented by the CIA Demonstration Program will make it easier for the target audience to acquire information about new energy-efficient technologies and gain a better understanding of the benefits provided by energy-efficient building practices. This will help overcome "business-as-usual" design practices that continue the use of outdated technologies. It is thought that once customers see the advantages of particular new technologies, procedures, or designs, they will more likely to adopt them as standard practice for their organizations.
Program Implementers and Affiliates: Utility staff, vendors, equipment manufacturers
Customer/Building Type: Large commercial, industrial, and agricultural
Energy End Uses: Space heating, space cooling, process, other
Energy End Uses/Technologies: All, with particular emphasis on advanced HVAC, desiccant cooling, lighting, cooking equipment, advanced direct contact water heaters, refrigeration, process technologies, air compressors, remote monitoring and control, motors, and boilers
Customer Geographic Area: All CEC climate zones

B. Market Transformation Characteristics

Market Event: New construction, retrofit
Market Barriers Addressed: Performance uncertainties, information or search costs, hassle or transaction costs, asymmetric information or opportunism, service or product unavailability
Market Barriers Not Addressed: Organizational practices or customs, bounded rationality, access to or understanding of financing, misplaced or split incentives, inseparability of product features
How is the market changing (if at all)? CIA customers' emphasis on first-cost and a "business-as-usual" approach to specification of energy-using equipment creates barriers to adoption of new energy-efficient products and technologies. This historical trend prevents most CIA customers

[66] Note that for 1998 programs, "program" is the *combination* of similar utility-sponsored programs.

from experimenting or purchasing new technologies without first seeing a demonstration of cost-savings or other benefits.

Other Market Transformation Activities In or Outside California: Other large-scale demonstration programs are being sponsored throughout the United States.

Services Provided to Market Actors:

Commercial/Industrial/Agricultural Demonstration Program

	Services Provided to Market Actors							
Market Actor	Information, Advertising, Websites	Training & Tools	Financial Help	Alliances, Labeling, Standards	Demon-stration	Project Assist-ance	3rd-Party Experts	Other:
Building Owners, Operators	Yes		Incentives		Yes			
Designer/Specifier								
Builders								
Contractors								
Lending Agents								
ESCOs	Yes				Yes			

C. Indicators of Program Performance

Energy or Value Indicators: Not available.

Market Indicators: Although no studies are available, in its second quarter filing, SoCal Gas reports that the focus on distributors (for promotion of horizontal axis washers in particular) appears successful and is a promising approach for future efforts.

Program Activity Indicators: Not available

D. Program Assessment Information

Evaluation of Assumptions: The critical underlying assumptions are that once CIA customers see successful demonstration projects of energy-efficient equipment of practices that they will change their behavior and purchase the new technology or implement the practice. This assumption can be tested by surveying CIA participants and non-participants.

Support for Market Transformation: Not available.

Conditions for Altering or Withdrawing Program: Although short term success can be judged by the penetration of the selected technologies in the marketplace, the long term goals need to be focused more on transforming the market to be ready for innovations that come along next. This can be assessed when new technologies arise, by the degree to which corporations are willing to invest in the R&D, and the willingness of building owners to experiment with new technology.

References:

Southern California Edison. *Appendix B to the Testimony of Southern California Edison in Support of the 1998 DSM Program Funding*. Rosemead, CA. October 1997.

Southern California Edison Company. *Extension of 1998 Energy Efficiency Program Plans and Performance Award Mechanisms.* Rosemead, CA. June 1998.

Southern California Edison. *1998 Energy Efficiency Programs Quarterly Report, Second Quarter*. Rosemead, CA. July 1998.

Southern California Gas Company. *Application of Southern California Gas Company*. Los Angeles, CA. October 1997.

Southern California Gas Company.*1998 Energy Efficiency Program Plans and Budgets*. Los Angeles, CA. June 1998.

Southern California Gas Company. *Second Quarter Program Review*. Los Angeles, CA. July 1998.

Premium Efficiency Relocatable Classrooms (PERC) Demonstration Program

A. Program Description and Objectives

Program Administrator Area: New construction
Program Budget: 1998 PGC Funding is $350,000 (New PY98 Utility Program)
Program Reporting Category: Nonresidential new construction
Program Commitment: 3 years
Program Description and Objectives: The Premium Efficiency Relocatable Classrooms (PERC) Program will work with manufacturers of relocatable classrooms to help them develop PERC as a business area. The program will also assist in demonstrations and subsequent workshops for schools, and continue monitoring of efficient classrooms built and equipped in 1998. The utility will work with schools, manufacturers, air conditioning suppliers, and other strategic allies such as the Coalition for Adequate School Housing (CASH), and the State of California. Two manufacturers will develop an energy efficient product, and then conduct demonstrations. Subsequent to the demonstrations, manufacturers will prepare an economic, market analyses, and educational campaign aimed at school purchasing agents.

In the past, the PERC program provided design assistance for three manufacturers to establish final specifications for more efficient classrooms. PY98 expenditures included: contract labor for managing the program; design assistance and monitoring; incremental material costs to be paid to manufacturers; monitoring equipment and labor for every energy-efficient unit; and incentives to manufacturers for PERCs with skylights and two-stage evaporative cooling.

The market transformation plan includes working with a representative group of manufacturers through each step of the process of developing PERCs as a viable product, including education and demonstration. Since the field of manufacturers is relatively small, it is anticipated that other manufacturers will adopt the PERC concept if the demonstration is successful.

Program Implementers and Affiliates: Utility staff, consultants
Customer/Building Type: Small commercial - classrooms
Energy End Uses: HVAC, lighting envelope
End Use Technologies, Services, Practices: Evaporative cooling, high efficiency fluorescent lighting, efficient heat pumps, low-e windows, skylights, radiant barriers, insulation
Customer Geographic Area: All of California

B. Market Transformation Characteristics

Market Event: New construction
Market Barriers Addressed: Acceptance of technology, cost effectiveness of supplying gas to classrooms, practical manufacturing constraints, awareness of market potential, organizational practices or customs, component costs, and service or product unavailability
Market Barriers Not Addressed: Performance uncertainties, information or search costs, hassle or transaction costs, asymmetric information or opportunism, bounded rationality, access to or understanding of financing, misplaced or split incentives, and inseparability of product features,
How is the market changing (if at all)? The PG&E October 1997 Application Filing Program filing indicated that no manufacturers were building energy efficient relocatable classrooms.

Other Market Transformation Activities In or Outside of California: None identified
Services Provided to Market Actors:
Premium Efficiency Relocatable Classrooms (PERC) Demonstration Program

Market Actor	Services Provided to Market Actors								
	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Labeling, Standards	Demon-stration	Project Assist-ance	3rd-Party Experts	Other: Product Devel. Assist.
Building Owners, Operators						Yes			
Designer/Specifier									
Contractors									
Retailers									
Distributors									
Manufacturers				Incentives					Yes
Lending Agents									
Other: School Purchasing Agents		Yes				Yes			

C. Indicators of Program Performance

Energy or Value Indicators: No cost effectiveness information is available. However, all promoted technologies are cost effective and this program has a relatively low cost, ability to transform the entire market, and both manufacturers and school districts have shown interest. Therefore, the program is anticipated to be highly cost-effective.

Market Indicators: PG&E reports that as technical discussions have proceeded, manufacturers have become more comfortable with the energy efficiency measures that make up PERCs. Supplemental information provided by PG&E in August 1998 indicated that participating manufacturers are including basic energy-efficiency upgrades as a no-risk product option. Participating manufacturers in PG&E's program are beginning to build more efficient classrooms for demonstration purposes. All of the manufacturers now accept one package as a no-risk product they can offer to schools. Also, informal market feedback from discussions with school representatives has been very positive; product interest is high.

Program Activity Indicators: PG&E reported that as of June, 1998, three manufacturers had agreed to build and sell two designs for demonstration purposes and the Consortium for Energy Efficiency (CEE) is considering adopting the program on a national basis.

D. Program Assessment Information

Evaluation of Assumptions: Demonstrations of PERCs by participating manufacturers and increasing interest by other competitors to offer PERCs will be a good indication of program success. Another indicator is school district demand for PERCs. Additional indications can be obtained by surveying manufacturers' sales literature to see if PERC features are being offered.
Support for Market Transformation: Tracking the development and demonstration of PERCs with a representative group of manufacturers through each step of the process will provide evidence of short-term success. Long-term support for market transformation can be assessed from PERC sales data and market effects studies of purchasers (schools) and manufacturers.
Conditions for Altering or Withdrawing Program: If the program is unable to garner support among potential purchasers (schools), the education program will need to be altered to better

demonstrate the benefits of PERCs. This assessment should be carried out once the education part of the process is underway.

References:

Pacific Gas and Electric Company. *Application of Pacific Gas and Electric Company for Approval of 1998 Energy Efficiency Programs, Shareholder Incentive Mechanism for 1998 Programs, as Cost Accounting Process for Transfer of Surcharge Funds, and Update of Energy Efficiency Commitments*. San Francisco, CA. October 1997.

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Pacific Gas and Electric Company. William Miller and Pat Eilert. "PG&E Energy Efficiency Program Supplemental Information." San Francisco, CA August 1998.

Developing Green Communities

A. Program[67] Description and Objectives

Program Administrator Area: New Construction
Program Budget: PY98 California PGC DSM Budget for the two 3rd-Party and the new PY98 utility program is $1.3 million.
Program Reporting Category: Residential New Construction and Nonresidential New Construction
Program Commitment: multi-year
Program Description and Market Transformation Plan: The market transformation plan for Developing Green Communities is based on the premise that local governments can overcome market barriers to energy efficiency by having their planning departments work with developers to incorporate energy efficiency measures in new residential, commercial, and industrial buildings. It is generally perceived that it is difficult to convince designers and builders of the value of exceeding state energy codes in houses they build. There is a need to address split incentives (i.e., first costs are borne by developers but the energy saving benefits are accrued by future homeowners).

Developing Green Communities addresses this split incentive problem by entering into the development approval process to provide assistance to planning/community development department personnel in identifying both community-level and building-level alternatives for improving energy efficiency that could be incorporated into a specific development plans. A local planning or community development department deals with a developer during the early stages of his/her projects, and the department's staff have leverage through the approval process to suggest options to encourage developers to put more emphasis on energy efficiency in their projects. The options and incentives are case-specific. For example, the planning personnel can tailor options or incentives for a particular residential subdivision plan through the negotiations that are carried out for the project. Moreover, there are community-level energy efficiency improvements that actually reduce development costs. Examples of these community-level improvements include changing street designs, planting street trees, and reducing street lighting. Building-level energy efficiency measures (e.g., high efficiency air conditioners, high efficiency furnaces) are also examined that can improve energy efficiency in houses at least 10% beyond Title 24 requirements.

The direct market transforming effects of Developing Green Communities are expected to include the following:

1. Standard planning and building practices will change in the selected communities. By participating in Developing Green Communities, the planning departments and developers in the participating communities are shown that incorporating energy efficiency into new developments can be accomplished without incurring undue costs. Changes to public works standards will have long-lasting effects in the way communities are developed.
2. Energy use will be permanently impacted in the projects that receive direct assistance, in that the way that new developments are designed and built can greatly impact the amount of energy that they use for decades. Some simple low-cost or no-cost measures, such as north-south building orientation, overhanging roofs, and tree shading can provide obvious heating and cooling benefits that persist for a long time. Other less obvious measures, including

[67] Note that for 1998 programs, "program" is the *combination* of similar utility-sponsored programs.

narrower streets (combined with a canopy of trees), natural drainage systems, and use of drought-resistant vegetation, can also reduce the energy consumed by a community and save developers money as well.

The indirect market transforming effects that are expected to result from Developing Green Communities include:

1. Planning departments in the communities participating in Developing Green Communities will learn how to better guide or require more efficient development patterns in their communities. This could take several forms. For example, the planning departments will have increased knowledge and understanding of the economic arguments to use in convincing developers to undertake energy efficiency actions. They may also formalize energy efficiency requirements in new planning and zoning codes. The projects in the Developing Green Communities also demonstrate to planning departments in other communities that changes in community design are worthwhile. This information is spread by planners communicating with each other and by planners moving from a position in one city to a position in another.

2. If shown that energy efficiency improvements can be made cost effectively, developers working in the assisted communities will be more inclined to voluntarily adopt more energy-efficient, less-costly community design practices for their future development. Because developers often have projects in several communities, a developer who has gained experience with energy efficient community design in one community may introduce those designs into subdivisions he/she develops in other communities.

Program Implementers and Affiliates: Consultants, engineering firms, Rebuild America
Customer/Building Type: All types, but with an emphasis on residential subdivision developments, commercial and industrial parks
Energy End Uses: All
End-Use Technologies, Services, Practices: All, but with emphasis on changing street designs, planting street trees, planting shade trees (all of which reduce urban heat islands), reducing street lighting, encouraging north-south building orientation, overhanging roofs, natural drainage systems, and use of drought-resistant vegetation.
Customer Geographic Area: all CEC climate zones

B. Market Transformation Characteristics

Market Event(s): New construction
Market Barriers Addressed: Organizational practice or custom, information/search costs, service or product unavailability, misplaced or split incentives
Market Barriers Not Addressed: Performance uncertainties, hassle or transaction costs, asymmetric information or opportunism, access to or understanding of financing
How is the market changing (if at all)? Not available

Other Market Transformation Activities in (or Outside) California: In California, the Residential Marketing/Incentives (RMI) Program provides marketing support and (in PG&E territory only) cash incentives to production home builders that design and build homes whose energy efficiency exceeds that required by Title 24.

Services Provided to Market Actors:

Developing Green Communities

	Services Provided to Market Actors								
Market Actor	Information, Advertising, Websites	Training & Tools	Linking Vendors & Customers	Financial Help	Alliances, Labeling, Standards	Demon-stration	Project Assist-Ance	3rd-Party Experts	Other:
Community Planning Directors	Yes	Yes				Yes	Yes	Yes	
Land and Community developers	Yes	Yes				Yes	Yes	Yes	
Builders	Yes					Yes			
Municipal facility operators	Yes					Yes			
Building operators/home owners	Yes								

C. Indicators of Program Performance

Energy or Value Indicators: Energy efficiency improvements are being recommended at the community level that provide energy savings of 5 to 10%; at the building level improvements are recommended that give savings that are over 10% beyond Title 24 requirements. Cost-benefit information was provided for the PG&E 3rd-party program. Cost per house to identify and analyze these energy efficiency improvements averages about $200-$300. Projected 1st year savings are 300 MWh, 200 kW, and 60,000 therms (based on engineering calculations and expected market penetration). Cost effectiveness as suggested by TRC tests is 2.06 (ADM's calculation as part of their PG&E 3rd-Party Program application, see ADM 1998); 15 year program-weighted" measure lifetime.

Market Indicators: Because the program began only recently, information has not yet been collected regarding effects, nor has the program been in field long enough to provide evidence of sustainability. A market effects study will be conducted.

Program Activity Indicators: As of June, 1998, Developing Green Communities had conducted outreach to over 250 cities in California. Subsequently, ten cities in PG&E's service territory, twelve in SCE's service territory, and seven in SoCalGas's service territory had agreed to participate in the program. Plans from various cities were being analyzed for energy efficiency improvements at that time. Progress to date has included evaluating energy efficiency alternatives for subdivisions totaling 1,200 houses. Projected activity to end of project is to impact subdivision plans that cover about 4,000 houses.

D. Program Assessment Information

Evaluation of Assumptions: The assumption underlying Developing Green Communities is that developers are willing to work with city/county planning departments to implement energy efficiency improvements in exchange for project approval. This assumption is to be tested and evaluated based on projects assessed through the program. Interviews with planning department

personnel and with developers are to be conducted to evaluate the attitudes of participating and non-participating communities and developers. Interviews with developers are conducted to assess their interest in improvements and development costs.

Support for Market Transformation: The initial progress can be assessed by considering: number of participating cities, number of projects that are undertaken or the square footage impacted; program cost-effectiveness; changes in government project specification and design practices; and use of successful project results in future projects. A market effects study is being done as part of the program. Information collected through the interviews with planning department personnel and with developers is used to analyze the market effects and market transformation impacts of Developing Green Communities. Each of the communities studied (both participants and non-participants) represents a case study. For this analysis, communities that have participated in the program are compared to similar communities that have not. Effects of Developing Green Communities are measured by determining how interest in energy efficiency has changed among planning department, elected officials, developers, etc. and what changes are expected in planning process because of the program.

Conditions for Altering or Withdrawing Program: Unless local governments fund consultants or staff to do this type of work, PGC funding will be needed to continue the program and market it to other local governments. Strong successes will be key to recruiting the interest and financial support from additional cities.

References:

ADM Associates, Inc. *Local Energy Assistance Program Supplemental Cost Effectiveness Calculations.* 1998.

Pacific Gas and Electric Company. *PG&E's Third Party Proposal Program Specific Conditions: Local Energy Assistance Program (Developing Green Communities).* San Francisco, CA. 1998.

Southern California Edison, *1998 Energy Efficiency Programs Quarterly Report: 2nd Quarter,* July 1998.

The Gas Company. *Consulting Agreement: Local Energy Assistance Program.* Los Angeles, CA 1998.

New Construction Nonresidential Standard Performance Contracting (NSPC) Program (New Program Concept)

A. Program Description and Objectives

Program Administrator Area: New Construction Nonresidential
Program Budget: New Program Concept (CEC proposes $1 million or approximately $100,000-$250,000 per design team, based on Commission experience with the City of Oakland project)
Program Reporting Category: Nonresidential Information, Commercial Energy Management Services, Commercial Energy Efficiency Incentives, Nonresidential New Construction
Program Commitment: Multi-year
Program Description and Market Transformation Plan: Buildings are designed, constructed and operated with little incentive for energy efficiency.[68] The New Construction NSPC Program provides incentives to building owners and designers for constructing new buildings that go beyond the minimum current building energy efficiency standards. The elements of the program include:

- Working with building owners to establish a performance contract for new construction projects for owner-occupied and speculative buildings. Establish the target or performance goal, determine the method to evaluate performance during the design phase. Establish a protocol for measuring performance after building construction and determine the architectural/engineering fee.[69]
- Providing incentives for the design and construction team to "go beyond" the minimum code requirements (such as Title 24) by cutting energy and total life-cycle costs, thereby improving building quality.[70] The design and construction team will need to ensure that buildings are properly executed in construction, commissioning, operation and maintenance. An incentive is offered for success and a penalty for failure.[3]
- Measuring and verifying that the new building performance meets the target through the use of detailed building simulation programs, such as DOE 2.1E. A "dead band" could surround the zero-rebate normal efficiency level so that no rebate is earned unless there is significant savings achieved compared to the baseline.[3]

The market transformation plan aims to make standard performance contracting (SPC) an integral part of the nonresidential new construction design process. Performance contracts provide an incentive to design and construct efficient buildings, making it worthwhile for designers to integrate energy efficiency into the plan from the start. Design rebates could have substantial leverage, because the present valued energy cost of a typical office building is ten to a hundred times its total design fees.[3] In the near term, paying the design team a "royalty" equivalent to a portion of the energy savings would increase their fees and encourage building design innovation. The maximum incentive or penalty could be set at a fixed amount, such as a percent of the project cost. For the City of Oakland, Administration Building Performance Contract, the maximum reward or penalty was 0.3 percent of the total project cost.[4] This was equivalent to $250,000. If

[68] *Energy Performance Contracting for New Buildings*, Charles Eley, 1997.
[69] *Performance Contracting for New Construction, Insuring Value from Your Investment*, Charles Eley, 1997.
[70] *Strategic Issues Paper: Energy Efficient Buildings: Institutional Barriers and Opportunities*, Amory Lovins, E-Source, 1992.

the building could reduce its annual cost by 16 percent of its targeted energy use, the design team would get $250,000. A 16 percent reduction in energy use translates to $70,000 per year of savings. In the long term after the program has been terminated, the building owners will see the benefits of having buildings that exceed the current standards, both in terms of property and revenue (savings for owner-occupied buildings) enhancement. The performance contracting concept is intended to become the standardized method that building owners use to ensure that the buildings are designed and constructed in a manner that will result in meeting the energy efficiency objectives in the design drawings similar to performance contracting for retrofits.

Program Implementers and Affiliates: Consultants, ESCOs, Building Owners, Government
Customer/Building Type: Commercial--all building types
Energy End Uses: HVAC, lighting, water heating, miscellaneous end uses
End-Use Technologies, Services, Practices: High efficiency HVAC, lighting, daylighting, water heating, fenestration, insulation, building shell, building controls.
Customer Geographic Area: All CEC climate zones

B. Market Transformation Characteristics

Market Event(s): New construction
Market Barriers Addressed: This program is designed to address the following barriers:

- current organizational practices or customs provide no incentive for innovative, energy saving designs. The current practice is to pay the designer a flat fee or percentage of construction costs. This arrangement discourages innovation since all benefits go to the building owner and all the risk resides with the designer.
- unknown building performance. The program would measure and verify that new building performance meets the target through the use of detailed building simulation programs such as DOE 2.1E. An incentive is offered for exceeding the standard and a penalty for failure.
- lack of information on performance contracting for new construction. This program will demonstrate and verify the savings based on actual measurements and determine the long term cost saving benefits to building owners/operators. The program will provide sample standardized performance contracts that could be used by building owners to establish the process.
- lack of knowledge about the process. The program manager or others would be available to "coach" the building owners through the process. One of the products of the program will be case studies and workshops. These products will provide information to building owners on the process and the short and long term benefits based on measured results.

Market Barriers Not Addressed: The following barriers are not addressed:

- transaction costs for a building owner to implement a performance contracting program--it is uncertain whether building owners would view a performance contract as a time consuming process that would delay the construction and completion of its building. It is hoped that by providing a standard performance contract, that this would provide a starting point for all parties and expedite the process, rather than delay it.
- attitudes of building owners and operators and their tenants to energy efficiency. It is uncertain whether all these parties will have similar goals or objectives especially in non-owner occupied, speculative buildings. If building tenants have no control over energy costs, such as built into its monthly lease payments, they may be uninterested in energy efficiency if it means

a reduction in comfort. Building operators may not want to "experiment" with energy efficiency because of fears of tenant complaints.

How is the market changing (if at all)? There is uncertainty on future electricity cost. Transmission and distribution costs might be fixed and based on the cost to provide services and indifferent to the amount of electricity consumed. Or transmission and distribution costs might remain unchanged from the current structure, such as charged on a $/kWh basis and be the same for all customers. This uncertainty could affect the cost-effectiveness of the types of energy efficiency projects, services or practices to be recommended. If there were no PGC-funded program to provide incentives, building designers, building owners, especially those building speculative buildings, would have no reason to incorporate energy efficient innovations into building designs and might look only at first cost, rather than life cycle cost.

Other Marketing Activities in (or Outside) California: California Energy Commission: Local Government and Schools Program (Energy Partnership and Bright Schools Programs) provides design assistance for new construction. Various 1998 Utility Programs: PG&E's Design Assistance Program uses simulation tools. SCE's Energy Design Resource Program provides nonresidential new construction incentives for buildings exceeding Title 24. SDG&E's nonresidential Energy Design Assistance and Savings Through Design Programs provides assistance for energy efficient design for nonresidential new construction projects. Other similar programs are operated by Ontario Hydro and Northeast Utilities.[71]

Services Provided to Market Actors:
New Construction Nonresidential SPC Program

	Services Provided to Market Actors							
Market Actor	Information, Advertising, Websites	Training & Tools	Financial Help	Alliances, Labeling, Standards	Demon-stration	Project Assist-ance	3rd-Party Experts	Other: Design Services
Building Owners, Operators	Yes		SPC Incentives					
Designer/Specifier	Yes		SPC Incentives					Provide
Builders								
Contractors								
Lending Agents								
Others								

C. Indicators of Program Performance

Energy or Value Indicators: In California, it is estimated that about 30 million square feet of new construction occurs annually. Typical energy use in these buildings is estimated to range from $1.50 to $2.00/square feet.[72] If building designers were provided incentives similar to the City of Oakland, Administration Building project, the energy cost could have been reduced to $1.08/square feet.[73] This would result in a 30-50 percent reduction in annual energy cost, or the equivalent of $12 to $30 million in annual energy cost reductions for all newly constructed

[71] *Strategic Issues Paper: Energy Efficient Buildings: Institutional Barriers and Opportunities*, Amory Lovins, E-Source, 1992

[72] Energy Commission estimate and also from *Diagnostics for Building Commissioning and Operation*, Sebald and Piette, Lawrence Berkeley National Laboratory, 1997.

[73] *Energy Performance Contracting for New Buildings*, Charles Eley, 1997.

buildings. This amount translates into an estimated annual 120,000 to 300,000 MWh savings and 4 to 10 million therms savings.[74]

Market Indicators: Specific market changes include increased building owner interest and understanding and knowledge of performance contracting for new construction results in successfully addressing the market barriers in Section B. With assistance from the program manager and others, building designers incorporate innovative designs that exceed current building standards. Building owners use the standardized performance contract developed through the program and have a high degree of confidence that the building designs will result in the energy savings. Building operators and tenants are "comfortable" with the new buildings and have no major complaints. Increased implementation of energy efficiency will increase product sales for manufacturers, distributors and vendors. This could result in lower equipment cost thus improving energy efficiency project economics.

Program Activity Indicators: Specific indicators include increased building owner interest in participating in the program as a result of the workshops, case studies, other informational items prepared from the program and/or demand by tenants or prospective lessees for buildings with reduced operating costs. Increased interest could result in over subscription to the program as demand for services and assistance exceeds available funds. Increased program participants will also positively affect the business of the following market actors: designers/specifiers, contractors, retailers, distributors, and lending agents.

D. Program Assessment Information

Evaluation of Assumptions: Some of the assumptions used in this program is being tested by the Energy Commission at the City of Oakland's new construction performance contracting pilot. The following table describes how each assumption can be tested during program operation:

Assumptions	Test
Building designers will incorporate innovation and energy efficiency into its designs if provided with an incentive.	• High subscription level for the program. • Attitude survey among participants and non participants to determine the importance of the incentive in improving building design
Provision of information on energy efficient building design will improve building owner understanding and acceptance of performance contracting.	• Survey participants and non-participants show that information was effective in communicating program results--case studies were understood and attitudes towards performance contracting was positive. • Surveys show that those building owners that received marketing materials, implemented a performance contracting program for new construction at a greater rate compared to those did not receive any materials • If participants use the standardized performance contract and implement the process on their own--consider this as market transformation.

Support for Market Transformation: In the short term, we hope to see increase building owner interest and participation in the program. In the long term, building owners will be future consumers of energy efficiency. Once they understand the process and see the verified energy and cost benefits, they will gain experience and the capability of using this process for future buildings.

[74] Commission staff estimate assuming 80% electricity and 20% natural gas savings and an average cost of $0.08/kWh and $0.60/therm

Building owners who have implemented a performance contracting program for new buildings can assist others in the future and help minimize the information barriers associated with implementation. In the short term, progress reports could be completed annually to chronicle the pre-design, design, construction and post-construction phases. As it could take many years for a building to be designed, constructed and operating, the long term results may be unavailable for several years. The factors that might confound support for market transformation are the changes in the electric industry due to restructuring. Adverse changes in the rate structure could substantially decrease the public's interest in energy efficiency. Changes in the economy could result in less interest in energy efficiency in favor of other high priority items.

Conditions for Altering or Withdrawing Program: Criteria for an annual evaluation should be developed prior to implementation of the program to determine whether goals and objectives have been met. The program should be evaluated annually and modified as necessary based on the results of the evaluation.

Reference:

Charles Eley. Performance Contracting for New Construction: Insuring Value from Your Investment. San Francisco, CA. 1997.

Amory Lovins. Energy Efficient Buildings: Institutional Barriers and Opportunities. E-Source. Boulder, CO. 1992.

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Integrated Systems Residential New Construction Program (New Program Concept)

A. Program Description and Objectives

Program Administrator Area: New construction
Program Budget: New Program Concept (Developed by the CEC)
Program Reporting Category: Residential New Construction
Program Commitment: Multi-year
Program Description and Market Transformation Plan: The Integrated Systems Residential New Construction Program will help participating builders to offer an integrated systems approach in the construction of new single family homes. The marketing component of the program will educate homebuyers on the improved comfort, safety, lower maintenance, environmental benefits (both indoors and out), and durability of super-efficient houses. Builders will offer guaranteed maximum energy bills to homebuyers as a tangible indicator of greater efficiency and comfort. Homebuyers' primary decision criteria are affordability, location, comfort, safety, potential appreciation, and ease of operation; energy efficiency per se is a lower priority. This program enables homebuyers to make the connection between their primary criteria and energy use as an indicator of those qualities, and then communicate to builders the additional market value of super-efficient homes. Builders then have a motive to continue to improve energy efficiency in all areas of home energy use, rather than focusing only on visible features that are easier selling points.

Example Program Description

While creative program design and implementation should be encouraged, a successful integrated systems approach to energy efficient residential construction must pursue all parts described below. Past residential new construction incentive programs often have not been self-sustaining because they only pursued some of the elements described here. The integrated systems approach, combined with effective consumer information, can change that. An example, showing a possible program format and why it is likely to be transformational, follows.

Program Steps

1. A collaborative of implementers and affiliates should organize the program, including coordination and facilitation of contractors. The collaborative would develop specific program protocols and obtain participant builders from strategic locations.
2. These builders, their subcontractors (HVAC, insulation, water heating, fenestration, etc. installers) and other related players would then begin thorough, ongoing training on the program protocols.
3. Model homes would be built and incremental cost differences, between standard construction practice and program protocols, would be paid with program funds.
4. The collaboration would develop or adopt guidelines for an energy bill guarantee. This program component should explore ways to provide a comfort guarantee, as some market participants are already doing. Funds would be set aside to insure the bill guarantee.
5. Partnerships with financial companies would be developed to make financing easier, and provide information to borrowers about enhanced benefits of super efficient houses.

6. A focused and intense marketing program to potential buyers in the target area would be developed based on market research, and undertaken to make consumers aware of the co-benefits of energy efficient homes. This component should be directed by the program manager, not individual builders to address issues that individual builders may be reluctant to discuss. This component could also be combined with other CBEE education or marketing programs.
7. Provide marketing support and materials that builders can use to customize their own marketing efforts.
8. Training and certification of diagnosticians using duct blasters, blower doors, infrared cameras, and other state-of-the-art equipment will facilitate the growth of the fledgling diagnostic industry, benefiting builders and contractors throughout the region.
9. Feedback on installation quality would be provided to builders and subcontractors.
10. More pilot homes would be built with program funding providing the incremental cost differences.
11. Meetings and negotiations with insurance companies would take place in an attempt to reduce construction defect liability insurance costs.
12. The program would include ongoing, real-time evaluation, reports, and awards to participants.
13. Insuring of the bill guarantee gives homeowners a standard for poor performance (rather than accepting lack of comfort), and provides feedback to builders on the quality of their homes, giving them an incentive and a mechanism to identify problem areas.

The market transformation plan aims to create an integrated systems approach to new home construction that incorporates guaranteed energy performance. The objective is to develop consumer demand for guaranteed energy performance (market pull) and builder support for guaranteed energy performance (market push). Since many homes in California markets are similar and are grouped in subdivisions adjacent to one another, consumers will begin to demand guarantees from neighboring production builders, motivating other builders to adopt or lower the guaranteed energy bill (or enhance the comfort guarantee) for further market share and differentiation. Increased demand will encourage the manufacturing and distribution sector to lower wholesale prices, thereby making the integrated systems approach no more costly to implement than current construction practice. In response to consumer demand, lower costs, and greater availability of skilled installers and diagnosticians, other builders will begin to adopt system concepts, with guaranteed comfort or energy use. Sustainable market transformation will occur as increasing numbers of builders continue to focus on ways to improve building performance, strengthening demand for more advanced energy efficient building materials and changing standard practice. *Energy Efficiency Standards* will become a minimum as builders seek market share by building beyond the code.

Program Implementers and Affiliates: New home builders, contractors, architects, consultants, engineers, HVAC and envelope diagnosticians, QA/TQM specialists, CEC, DOE, EPA.
Customer/Building Type: Residential single family
Energy End Uses: Initially, HVAC, lighting, water heating, ultimately all residential end uses.
End-Use Technologies, Services, Practices: Systems engineering approach for building design improves envelope, lighting, reduces ductwork and equipment size, improving efficiency and building durability, and reducing capital costs.

Customer Geographic Area: Initial efforts should focus on more extreme climate zones, with rapid growth in the new housing stock in a concentrated region. The Desert, Central Valley, or Sacramento areas are possible candidates.

B. Market Transformation Characteristics

Market Events: Construction and sale of new single family homes.
Market Barriers Addressed: Information costs and uncertainty for homebuyers; industry organizational practices and performance uncertainties; split incentives of builders with respect to efficiency investment; unavailability of high efficiency equipment and materials.
Market Barriers Not Addressed: Inseparability of product features.
How is the market changing (if at all)? A few progressive companies in small markets are successfully providing such guarantees, but it has been slow to spread. For the integrated systems approach to be more widely adopted, it must be promoted on a larger scale. Because developers/builders and subcontractors do not have the expertise, are not aware of benefits they themselves could receive, and are first-cost oriented, a financial "spark" is needed to ignite the house-as-a-system approach to residential energy efficiency.
Other Marketing Activities in (or Outside) California: The integrated systems approach is being used in other programs such as Build America and EPA Comfort Homes. Bill/comfort guarantees are being provided by a number of firms in conjunction with Comfort Homes and independently by others, such as “Certified Performance Homes” (CertainTeed Corp.), Chitwood Energy Management Services, Perry Bigelow, Bigelow Homes, Illinois (a list is available on request).
Services Provided to Market Actors:
Integrated Systems Residential New Construction Program

Market Actor	Services Provided to Market Actors							
	Information, Advertising, Websites	Training & Tools	Financial Help	Alliances, Labeling, Standards	Demon-stration	Project Assist-Ance	3rd-Party Experts	Other: Guaran-teed Energy Bills
Home Owners/operators	Yes							Yes
Designer/Specifier								
Builders	Yes	Yes						Provide
Contractors		Yes						
Lending Agents	Yes							
Real Estate agents	Yes							
T-24 Energy Consultants		Yes		Yes	Yes	Yes		
Building depart. personnel								
Home energy raters	Yes							

C. Indicators of Program Performance

Energy or Value Indicators: Energy savings of 50-70% per house compared to Title 24. In the desert, savings would be 11,900 kWh and 340 therms per year per house.[75] In the Central Valley

[75] Source: Chitwood Energy Management, Mt. Shasta, CA.

electricity savings decline to 3,000-4,500 kWh.[76] The life of the HVAC system is 15 years. The proposed program budget is $10,000,000 (for first 525 houses - no subsequent funding required). The most important aspect of the budget is determining a level that will yield program "critical mass." If too little is appropriated, the desired market transformation may not take place. Assuming the project is split between the Desert and Central Valley, first year energy savings would be approximately 4,300,000 kWh and 179,000 therms, with a discounted payback of five years.

Market Indicators: Greater availability and lower cost of high efficiency equipment and components; greater market share of "super-efficient" houses, increased demand for energy/comfort guarantees.

Program Activity Indicators: The number of high efficiency houses built and sold, number of trained diagnosticians working.

D. Program Assessment Information

Evaluation of Assumptions: The three key assumptions are: 1) that program builders will be willing and able to adopt the integrated system approach, 2) that they will gain market share/profits through use of a guarantee, and 3) that the use of guarantees, with their attendant motivation to builders to continue to improve efficiency, will continue to spread after incentives are withdrawn because of a combination of consumer demand and lower costs.

1. Guarantees will attract homebuyers: Receptivity of homebuyers to the bill guarantee can be evaluated before the program by looking at the success of builders who have or continue to use bill or comfort guarantees. Other guarantee programs should be reviewed to gauge the effectiveness of different formats, and to see whether, as predicted, programs that more effectively convey the co-benefits of lower energy use elicit greater consumer response.

2. The systems engineering approach will spread as distribution costs fall and skill levels rise: The minimum scale of the program necessary for these assumptions to prove true should be investigated through dialog with manufacturers, distributors, and builders.

3. Builders will be willing and able to adopt changes necessary for success: Builders may find it difficult to change internal practices to adapt to this new approach. The program must continually monitor and evaluate builder receptivity to find workable strategies for participants to adopt program practices.

Support for Market Transformation: Evidence of market transformation will be builders that compete for market share by innovating with respect to overall building performance and energy efficiency, in addition to more visible features.

Conditions for Altering or Withdrawing Program: As builders realize the benefits of capital and insurance cost savings, payments to builders for incremental participation costs and other program assistance can be withdrawn.

References:

Hoeschele, Marc, David Springer, and Joseph C. Kelly. "Implementation and Operation of an "Integrated Design" Desert House." 1996 ACEEE Summer Study on Energy Efficiency in Buildings p 1.131 Washington, DC: American Council for an Energy-Efficient Economy, 1996.

[76] Based on integrated design concept applied to new homes, in Elberling, et. al. "Advanced Customer Technology Test for Maximum Energy Efficiency (ACT2): The Final Report."

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