California Energy Efficiency Policy and Program Priorities

Prepared for the California Board for Energy Efficiency

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FINAL REPORT

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1. Executive Summary

The objectives of the study are to review existing, new, and proposed energy-efficiency programs in California and other States, and to develop criteria, methodology, and rules to make recommendations for programs in each California Board for Energy Efficiency (CBEE) administrator area based on the California Public Utilities Commission (CPUC) *Adopted Policy Rules for Energy-Efficiency Activities*[1] (henceforth referred to as the *Adopted Policy Rules*). The study provides program assessments for existing, new, and proposed programs in the nonresidential, residential, and new construction administrator areas.

The study relies on input from numerous sources: utility advice letter filings, application filings, quarterly reports, measurement and evaluation (M&E) studies, market effects studies, information from related studies and background material, as well as extensive public input from a series of workshops, and submitted program templates from program managers, state and federal agencies, advocacy organizations, private consultants, researchers and lobbyists. An enormous amount of comment provided electronically was processed, resulting in about 100 comments, and with an additional 200 or so comments from the public workshop. All public comments were carefully considered in developing this report.

Energy-efficiency program recommendations by administrator area are summarized in Table 1. Program recommendations in this report are based on individual program assessments, and no attempt is made to recommend a portfolio of programs. No recommendations are made regarding funding levels related to the recommendations. The recommendations do not take into account interactions between programs. For example, a program might be desirable because it was the only one to target small financing for commercial customers, but this would not be reflected in the recommendations. The recommendations do not take into account the extent to which a target market may (or may not) be already served by another program.

The *Adopted Policy Rules* place more importance on programs that are cost effective, and provide a clearly defined plan for transforming markets for energy efficiency in a self-sustaining way. Our methodology therefore places primary importance on recommending programs that meet these criteria. The *Adopted Policy Rules* only require the portfolio of programs to be cost effective, not that each individual program is cost effective. Therefore, these recommendations should not be interpreted as a hurdle for individual programs. Rather, the recommendations provide an indication of how well each program meets the criteria in terms of providing descriptive information and evidence to support cost effectiveness, potential for market transformation, and other criteria for incentive programs, SPC programs, and CPUC related activities. The recommendations may be used to select a portfolio of programs that can, as a group, transform markets for energy efficiency in a self-sustaining way.

More than 200 energy-efficiency programs in California and other states were considered for this report. Approximately 170 programs were finally selected, and of these a preliminary group of 52

[1] For a list of definitions see Appendix A. This summary is taken from the CPUC *Adopted Policy Rules for Energy-Efficiency Activities.*

were selected as groups of "like" programs.[2] In addition to this preliminary group of 52 programs, 18 new program concepts were submitted at the Public Workshop held on August 4, 1998 or delivered via mail or email by the August 6, 1998 deadline. Eight of the new program concepts were included for consideration—the remaining 10 were integrated into existing program templates. Thus, a total of 60 groups of "like" programs or new program concepts are included in the program summary templates in Appendix B. These include 28 programs for the nonresidential administrator area, 17 for the residential administrator area, and 15 for the new construction administrator area.

Of the 60 programs assessed in this study only one nonresidential program is highly recommended. Thirty-two programs are recommended—15 in the nonresidential administrator area, 9 in residential, and 8 in new construction. These programs were found to satisfy all criteria to at least a moderate or limited extent. Ten programs are recommended pending cost effectiveness evaluation, and 5 recommended pending further study. The summary templates for these programs are missing critical information or evidence about cost effectiveness, and may also lack information or evidence supporting the market transformation plan. The recommendations for these programs could be upgraded once this information is made available. (It is also possible that negative findings could downgrade the recommendation). Finally, 7 programs would merit consideration if they were redesigned to improve either cost effectiveness or market transformation, and 5 programs did not meet the criteria.

Chapter 2 provides a discussion of the review and selection of programs considered for the study, how programs were grouped into "like" programs, and the program summary template. Chapter 3 provides the criteria, methodology, and rules used to make program recommendations. Chapters 4, 5, and 6 provide program recommendations, assessments, summary tables of program services provided to market actors, end uses, technologies, services, practices, market events, customer/building type, and PY98 budget, as well as each program's balanced portfolio contribution for the residential, nonresidential, and new construction administrator areas. Appendix A contains the following three memorandums to the CBEE:

1) Clarification and design recommendations for the Residential Energy Efficiency Mortgages and Loans Program;[3]
2) Design recommendations for the Residential Information and Education Program and Residential Audits and Surveys Program; and
3) Design recommendations for the Residential Standard Performance Contract Program.

The program summary templates for 1998 programs in California and other states are provided in Appendix B, which is the key supporting document to this policy and program priorities report.

[2] Like programs are defined as having similar market segments, market actors, market barriers addressed, and intervention strategies.

[3] Previously titled the Residential Financing Program.

Table 1. Summary of Program Recommendations[4]

Recommendation	Nonresidential Administrator Area	Residential Administrator Area	New Construction Administrator Area
Highly recommended	• Large CIA Downstream Incentives	• None	• None
Recommended	• Small Commercial Customer Surveys and Audits • Large CIA Customer Surveys and Audits • Nonresidential Standard Performance Contract (NSPC) (new PY98) • Small Commercial "Downstream" Incentives • Nonresidential "Upstream" Package AC Distributor Incentives (new PY98) • Nonresidential "Upstream" Motors Incentives (new PY98) • Nonresidential "Upstream" LED Exit Sign Incentives (new PY98) • Implementation Assistance • LED Traffic Signals Standards (new PY98) • Hotel and Motel Efficient Technologies (new PY98) • Vendor Linkages to Customers (new PY98 & 3rd-party) • Local Government and Community Energy Efficiency (3rd-party & out-of-state) • Integrated Small Commercial Energy Efficiency (new concept) • California Industrial Solutions (new concept) • Integrated Irrigation System Operation (new concept)	• Centralized Procurement of Energy Efficient Appliances (new PY98 & 3rd-party) • Air Conditioning Contractor Training (3rd-party & out-of-state) • Alliances/ Branding/ Labeling (new PY98 & out of-state) • Residential Standard Performance Contract (RSPC) (new PY98) • "Downstream" Appliance Incentive (existing & 3rd-party) • Residential "Upstream" Incentives • Spare Refrigerator Recycling • Residential Energy Efficiency Mortgages and Loans (new PY98 & 3rd-party) • Appliance Early Retirement (new concept)	• Standards and Protocols Program (new PY98, 3rd-party & out-of-state) • Residential Marketing/Incentives Program (existing & 3rd-party) • Nonresidential Incentives/Marketing Program • Nonresidential Design Assistance Program • Premium Efficiency Relocatable Classrooms Demonstration Program (new PY98) • Developing Green Communities (new PY98 & 3rd-party) • New Construction Nonresidential Standard Performance Contract (new concept) • Integrated Systems Residential New Construction Program (new concept)

[4] Existing programs are not labeled in Table 1, 3rd-party and out-of-state programs are labeled, and new programs in 1998 are labeled as "new PY98."

Table 1. Summary of Program Recommendations (continued)

Recommendation	Nonresidential Administrator Area	Residential Administrator Area	New Construction Administrator Area
Recommended pending cost effectiveness	• Corporate Energy Benchmarking • Energy Efficiency Centers • Food Service Equipment Center	• California Home Energy Efficiency Rating System (CHEERS) Support Program (3rd-party & out-of-state) • Residential Energy Efficiency Training Center	• Design Tools and Practices (new PY98) • Energy Centers • Residential/Small Commercial Demonstration (new PY98 & 3rd-party) • Title 24 Enforcement Education (3rd-party & out-of-state) • Commercial/Industrial/ Agricultural Demonstration
Recommended pending further study	• Daylighting Productivity Study (3rd-party & out-of-state) • Microelectronics Industry Efficiency Initiative (out-of-state) • Silicon Crystal Growing Facilities Program (out-of-state) • Energy Efficiency and Property Valuation Study (3rd-party)	• Public Sector Housing Design Guidelines and Procurement Assistance (out-of-state)	• None
Merits consideration with redesign	• Customer Information Program • Building Recommissioning Demonstration Program (new PY98 & 3rd-party) • Lighting Controls Demonstration Program (new PY98)	• Residential Information and Education (3rd-party) • Audits and Surveys (3rd-party) • Integrated Residential Retrofit (new concept)	• Energy Efficient Manufactured Housing Promotion (out-of-state)
Does not meet criteria	• Facility Engineer Training Program (new P98 & out-of-state) • Nonresidential Financing Program (new PY98)	• "Upstream" Windows Training (3rd-party) • Contractor Marketing	• Residential Design Assistance (new PY98)

2. Review Methodology and Program Summary Template

The goal of reviewing existing, new, and proposed utility energy efficiency programs is to identify successful or promising programs that will provide a basis for statewide California programs in 1999. This section provides a description of the methodology used to review energy efficiency program experience in California and other states. The chapter contains the following sections:

- Methodology for Grouping "Like" Programs;
- List of "Like" Programs by Administrator Area; and
- Program Summary Template.

2.1. Methodology for Grouping "Like" Programs

Energy efficiency programs administered by the four California investor-owned utilities were reviewed as part of this report as well programs administered by the utilities but implemented by 3rd-parties. The four California investor-owned utilities include:

- Pacific Gas and Electric;
- San Diego Gas and Electric;
- Southern California Edison; and
- Southern California Gas.

In addition, we reviewed energy efficiency programs administered by other organizations around the country. These other programs represent the best ones being run outside the state and are sponsored by the following organizations:

- Northwest Energy Efficiency Alliance (NEEA);
- Northeast Energy Efficiency Partnership (NEEP);
- Consortium for Energy Efficiency (CEE);
- Environmental Protection Agency (EPA); and
- Energy Center of Wisconsin.

Three steps were taken as part of the review and assessment:

- Program grouping;
- Development of a standard program summary template; and
- Review and completion of program summary templates.

Each of these steps is discussed below.

2.1.1. Program Grouping

In order to organize the more than two hundred programs in California and other states, the myriad energy efficiency programs were grouped using four logical steps described below.

Step 1. The first step was to group programs according to market events[5] such as retrofit and new construction according to the three administrator areas:

- Nonresidential retrofit;
- Residential retrofit; and
- New construction.

The programs were classified by administrator area based on the primary function. However, some programs overlap more than one administrator area. For example, PG&E's Stockton Training Center overlaps residential, nonresidential, and new construction administrator areas as well as CBEE and the Low-Income Governing Board (LIGB). These "cross-cutting" programs were grouped based on how they are classified in the filings and their predominant function.[6]

Step 2. The second step was to group programs according to three market descriptors:

1) Market segment and delivery strategy (e.g., residential or commercial information, surveys & audits, incentives, alliances/branding/labeling, new construction design tools, residential and nonresidential standard performance contract);
2) End uses (e.g., spare refrigerator, LED exit signs, "upstream" packaged A/C or motors); and
3) Market actors (e.g., centralized procurement, Title-24/contractor training, energy efficiency mortgages and loans).

Step 3. The third step was to group similar programs. This was done because many of the programs administered by individual utilities and other organizations had similar counterparts. The level of grouping was structured such that programs can be separated into many of the anticipated divisions that interest market actors and policy makers. As defined in step 2, rebates and performance contracting were not mixed. Similarly, survey programs for small and large commercial customers were kept separate.

Step 4. The fourth step was to consider unique new programs implemented by California utilities in PY 1998, programs implemented by 3rd-parties in 1998, and programs implemented by out-of-state parties in 1998.

2.1.2. Development of a Program Summary Template

After grouping of programs, the next step in the process was to develop a program summary template. This template was developed based on the CBEE public workshop guidelines[7] with input from project staff and CBEE members. The four main sections of the template are:

- Program Description and Objectives;
- Market Transformation Characteristics;

[5] Step 1 of the program grouping methodology uses administrator areas as a convenient way to differentiate between market events and assumes that further distinctions such as planned versus emergency replacement are adequately included within the programs.

[6] Chapter 3 provides a discussion of "cross-cutting" programs within the balanced portfolio criteria, and Chapters 4, 5, and 6 provide a list of cross-cutting programs identified in this report.

[7] J. Eto. R. Prahl. J. Raab. J. Schlegel. *Proposed Recommendations to CBEE on Program Classifications, Cost Effectiveness, Capability of Transforming Markets, and Market Assessment and Evaluation.* Prepared for the CBEE Public Workshop Participants and Other Interested Parties. February 4, 1998.

- Indicators of Program Performance; and
- Program Assessment Information.

The example program summary template is shown below in Section 2.3.

2.1.3. Review and Completion of Program Summary Templates

Review and completion of the preliminary 52 program summary templates were based on public record documents, such as:

- Regulatory filings, such as utility advice letters, milestone reports, etc.;
- Program evaluations; and
- CADMAC market effects studies.

The program summary templates were then presented for public comment and review. Verbal and written comments were carefully considered in the final draft. Market actors commenting on the program evaluation templates included:

- California utility staff;
- CBEE Board members;
- ESCO industry representatives;
- Utility staff from other geographic areas;
- Customers;
- Vendors;
- Distributors;
- Consultants;
- Local Governments; and
- Non-governmental organizations.

2.2. List of "Like" Programs by Administrator Area

More than 200 energy-efficiency programs in California and other states were considered for this report. Approximately 170 programs were finally selected, and of these a group of 52 were selected as groups of "like" programs.[8] In addition to this group of 52 programs 18 new program concepts were submitted at the Public Workshop held on August 4, 1998 or delivered via mail or email by the August 6, 1998 deadline. Eight of the new program concepts were included for consideration. A total of 60 groups of "like" programs or new program concepts are included in the program summary templates in Appendix B. These include 28 programs for the nonresidential administrator area, 17 for the residential administrator area, and 15 for the new construction administrator area.

[8] Like programs are defined as having similar market segments, market actors, market barriers addressed, and intervention strategies.

2.2.1. Nonresidential Groups of "Like" Programs in California and Other States

The following 28 programs were developed for the nonresidential administrator area. Program administrators (interim or otherwise), 3rd-party programs, out-of-state programs, and new concepts are indicated in parentheses. Program summary templates for each are provided in Appendix B.

1) Corporate Energy Benchmarking (existing utility)

Business Energy Management Services - CustomNet (PG&E)

2) Customer Information (existing utility)

Nonresidential Information - C&I Support Center Hotline (SoCalGas)
Nonresidential Information (SDG&E)
Con. WEB (NEEA)
Energy Ideas Clearinghouse (NEEA)
Evaporator Fan VFD Initiative (NEEA)
Scientific Irrigation Scheduling (NEEA)
Compressed Air Challenge (ECW-Wisconsin)

3) Small Commercial Customer Surveys and Audits (existing utility)

Business Energy Management Services (PG&E)
Small Business Energy Use Survey (SCE)
Small Commercial Audit (SDG&E)
Commercial Energy Management Services (SoCalGas)

4) Large Commercial/Ind./Agricultural Customer Surveys and Audits (existing utility)

Commercial and Industrial Energy Management Services (SCE)
Agricultural Energy Management Services (SCE)
Industrial Energy Management Services (SoCalGas)
Manufacturers Extension Partnership (ECW-Wisconsin)
In-Service Industrial Motors Testing (NEEA)

5) Energy Efficiency Centers (existing utility)

Customer Technology Applications Center (CTAC) and AgTAC (SCE)
Nonresidential Information (SDG&E)
Energy Resource Center (SoCalGas)

6) Building Recommissioning (new PY98 utility and 3rd-party)

Energy Management System (EMS) Services (PG&E 3rd-party program)
Building Commissioning (PG&E)
Quality Installation Guidelines Development (CEE)
Building Energy Use Simulation (NEEA)
Building Commissioning Market Assessment (NEEA)
Commissioning Public Buildings in the Northwest (NEEA)
Energy-Efficient Pkg. HVAC Equipment and Practices for Commercial Bldgs. (NEEP)
Energy Efficient Lighting for Commercial Facility Remodels and Expansions (NEEP)

7) Facility Engineer Training (new PY98 utility and out-of-state)
Building Operator Certification (SDG&E and NEEA)
Northwest Energy Education Institute (NEEA)

8) Food Service Equipment Center (existing utility)
Food Service Technology Center (PG&E)

9) Nonresidential Financing (new PY98 utility)
Energy Cents Program (SDG&E)

10) Nonresidential Standard Performance Contract (NSPC) (new PY98)
Nonresidential Standard Performance Contract (PG&E, SCE, SDG&E)

11) Small Commercial "Downstream" Incentives (existing utility)
Express Efficiency (downstream rebates) (PG&E)
Small Commercial Rebate (SDG&E)
Small Business Lighting Modification (SCE)
Commercial Equipment Replacement (SoCalGas)

12) Large Comm./Ind./Agricultural "Downstream" Incentives (existing utility)
Express Efficiency (downstream rebates) (PG&E)
Energy Efficiency Incentive (SCE)
Industrial Energy Efficiency Incentives (SoCalGas)
Premium Efficiency Motors (NEEP)

13) Nonresidential "Upstream" Package AC Distributor Incentives (new PY98 utility)
Express Efficiency (upstream rebates) (PG&E)
High Efficiency Commercial Air-Conditioning Initiative (CEE)

14) Nonresidential "Upstream" Motors Incentives (new PY98 utility)
Express Efficiency (upstream rebates) (PG&E)
Energy Efficient Motors (SDG&E)
Premium Efficiency Motors (NEEA)
Motors Standards Development and Education (CEE)

15) Nonresidential "Upstream" LED Exit Sign Incentives (new PY98 utility)
LED Exit Sign Retrofit/Replacement (SCE)

16) Implementation Assistance (existing utility)
PowerPact (PG&E)
Energy Edge (SoCalGas)
Federal Procurement Support (CEE)

17) LED Traffic Signals Standards (new PY98 utility)

LED Program (PG&E)
LED Traffic Signals Evaluation (CEE)

18) Hotel and Motel Efficient Technologies Demonstration (new PY98 utility)
Hotels and Motels (PG&E)

19) Lighting Controls Demonstration (new PY98 utility)
Lighting Controls (PG&E)

20) Daylighting Productivity Study (3rd-party and out-of-state)
Expanding the Market for Skylighting in California (PG&E 3rd-party)
Daylighting Collaborative (ECW-Wisconsin)

21) Microelectronics Industry Efficiency Initiative (out-of-state)
Microelectronics Industry Efficiency Initiative (NEEA)

22) Silicon Crystal Growing Facilities (out-of-state)
Silicon Crystal Growing Facilities (NEEA)

23) Vendor Linkages to Customers (new PY98 utility and 3rd-party)
SmartSource [filed as SmarterEnergy in June] (PG&E)
Torchiere Program (PG&E 3rd-party)

24) Energy Efficiency and Property Valuation Study (3rd-party)
Project on Energy Efficiency and Property Valuation (PG&E 3rd-party)

25) Local Government and Community Energy Efficiency (3rd-party and out-of-state)
Community Energy Assistance (PG&E 3rd-party)
Community Energy Planning Assistance (PG&E 3rd-party)
Local Government Associations (NEEA)

26) Integrated Small Commercial Energy Efficiency (new concept)

27) California Industrial Solutions (new concept)

28) Integrated Irrigation System Operation (new concept)

2.2.2. Residential Groups of "Like" Programs in California and Other States

The following 17 programs were developed for the residential administrator area. Program administrators (interim or otherwise), 3rd-party programs, out-of-state programs, and new concepts are indicated in parentheses. Program summary templates for each are provided in Appendix B.

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)

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 (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)

2.2.3. New Construction Groups of "Like" Programs in California and Other States

The following 15 programs were developed for the new construction administrator area. Program administrators (interim or otherwise), 3rd-party programs, out-of-state programs, and new concepts are indicated in parentheses. Program summary templates for each are provided in Appendix B.

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)

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) Demonstration (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)

2.3. Program Summary Template

Program Summary Template

A. Program[9] Description and Objectives

Program Administrator Area: (Residential, Nonresidential, and New Construction)
Program Budget: (e.g., PY98 California PGC DSM Budget $ million)
Program Reporting Category: (Residential Information, Residential Energy Management Services, Residential Weatherization Retrofit Incentives, Residential New Construction Appliance Incentives, Nonresidential Information, Commercial Energy Management Services, Industrial Energy Management Services, Agricultural Energy Management Services, Commercial Energy Efficiency Incentives, Industrial Energy Efficiency Incentives, Agricultural Energy Efficiency Incentives, Nonresidential New Construction, Other)
Program Commitment: (e.g., multi-year, single year)
Program Description and Market Transformation Plan: Describe the targeted market, the proposed energy-efficiency enhancement**(s)** (product, service, or practice), how are the program-sponsored services or activities expected to affect current practices, privatization, and market actors with respect to the adoption of the targeted energy-efficient technology, service, or practice -- both: a) in the short-term, while the program is in operation, and b) in the long-term, after the program might be changed or has been withdrawn.
Program Implementers and Affiliates: (e.g., consultants, utility staff, ESCOs, vendors, distributors, retailers, and government)
Customer/Building Type: (e.g., residential, small commercial (define), other commercial, industrial [2-digit SIC codes], agricultural/CEC end-use forecasting categories for residential single family, multifamily, mobile home, commercial (10 building types)
Energy End Uses: (e.g., HVAC, lighting, refrigeration, water heating, etc.)
End-Use Technologies, Services, Practices: [e.g., T-8 fluorescent lamps with electronic ballasts or low SHGC residential windows, but not by detailed product classifications by manufacturer or model number].
Customer Geographic Area: (e.g., CEC climate zones)

B. Market Transformation Characteristics

Market Event(s): (primary/secondary: new construction, renovation/rehab (in which Title-24 is invoked) renovation (w/o Title 24), planned replacement, emergency replacement, retrofit)
Market Barriers Addressed: (organizational practices or customs, 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)
Market Barriers Not Addressed: (organizational practices or customs, 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)? How would these changes affect the adoption of the targeted energy-efficient product, service, or practice, if there were no PGC-funded program? What conditions or features of the market (or market barriers) currently prevent customers from fully seeking and obtaining all cost-effective energy-efficiency products and services in the private, competitive market and why?
Other Market Transformation Activities in (or Outside) California: (list)
Services Provided to Market Actors: (See following tables)

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

Program Summary Template (continued)

Table 2.2a. Market Services Provided to Market Actors for Nonresidential Retrofit

	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									
Contractors									
Retailers									
Distributors									
Manufacturers									
Lending Agents									
Other:									

Table 2.2b. Market Services Provided to Market Actors for Residential Retrofit

	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								
Designer/Specifier								
Contractors								
Retailers								
Distributors								
Manufacturers								
Lending Agents								
Other:								

Table 2.2c. Market Services Provided to Market Actors for New Construction

	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									
Contractors									
Retailers									
Distributors									
Manufacturers									
Lending Agents									
Other:									

Program Summary Template (continued)

C. Indicators of Program Performance
Energy or Value Indicators: ultimate outcomes (annual and lifetime energy savings, peak demand); "program-weighted" measure lifetime, cost-effectiveness – PPT and Participant Test (for PY99 only)[10] Describe market segment energy use, estimated market penetration, demand response, and resultant energy savings.
Market Indicators: market changes, market effects, and/or reductions in market barriers; leading or interim indicators (changes in awareness, availability, pricing, organizational practices); product sales
Program Activity Indicators: execution of planned activities and implementation of tasks in plan; participating customers and market actors

D. Program Assessment Information
Evaluation of Assumptions: How can/has each of the important underlying assumptions be tested or evaluated before, during, or after program operation?
Support for Market Transformation: What observations or data will provide evidence supporting the realization of the expected short- and long-term effects? When and how could they be made available? What factors might confound interpretation of this evidence as being supportive of these effects?
Conditions for Altering or Withdrawing Program: Under what conditions should the program be altered or withdrawn? With what frequency should these conditions be assessed? Are there any indications that the private market is adopting the technologies, practices, or services?

References: List by order of appearance (e.g., Author name(s), *Title*, Publication, Book, or Report title. Publisher. City, State. Month, Year.

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

3. Criteria, Methodology, and Rules for Making Program Recommendations

This chapter provides a description of the criteria, methodology, and rules for making recommendations for energy efficiency programs in California and other States (as well as new program concepts[11]). The methodology and rules differ for existing programs, new programs, and proposed program concepts.[12] This chapter contains the following sections:

- Criteria for Assessing Each Program;
- Methodology for Applying the Criteria; and
- Rules for Making Program Recommendations.

3.1. Criteria for Assessing Each Program

The criteria are based on the CPUC *Adopted Policy Rules for Energy Efficiency Activities*[13] (henceforth referred to as *Adopted Policy Rules*). The *Adopted Policy Rules* contain program design requirements and eligibility guidelines that are summarized below as the criteria used to assess potential program success.

3.1.1. Cost-Effectiveness Criteria (Rule IV-1 and IV-3)

Programs are expected to be cost effective.[14] This condition applies to the entire portfolio of PGC-funded activities and programs and is a threshold condition for eligibility for PGC-funds. It is important to note that individual programs need not necessarily be demonstrated to be cost effective on their own, especially if they are new, cross-cutting, or included in the portfolio on the basis of the balance criterion rather than cost-effectiveness. The portfolio as a whole, however, is expected to be cost effective. On-going demonstration of continued expectations for cost effectiveness of the portfolio (on at least an annual basis) is a necessary condition for continued receipt of PGC funds.

3.1.2. Market Transformation Criteria

The market transformation criteria are based on *Adopted Policy Rules* IV-2, II-4 and IV-5.

[11] Eighteen proposed program concepts were submitted at the public workshop held on August 4, 1998 or delivered via mail or email by the August 6, 1998 deadline. Ten of the proposed program concepts were similar to programs already under consideration based on the review of 1998 programs in California and other States (see Appendix B). Eight of the program concepts were unique and are included here as proposed program concepts. New programs are new in 1998, and existing programs have also run at least one year prior to 1998.

[12] Existing programs were implemented in California and other states prior to 1998. New programs were first implemented in 1998. New concepts have not yet been implemented, and were provided through public comment.

[13] CPUC. *Adopted Policy Rules for Energy Efficiency Activities*. CPUC Decision 98-04-063.

[14] Conditions other than cost effectiveness may allow a program to be included with a portfolio (see Rule IV-4).

3.1.2.1. Transforming Markets for Energy Efficiency (Rule IV-2)

Programs must be capable of transforming[15] markets for energy efficiency in a self-sustaining way (as described by Rule II-5).

3.1.2.2. Reducing or Eliminating Market Barriers (Rule II-4)

Programs must reduce or eliminate market barriers in ways that allow customers to obtain all cost-effective energy-efficiency products and services in a self-sustaining fashion without the continuing need for PGC-funded programs.

3.1.2.3. Market Transformation Characteristics and Assessment (Rule IV-5)

To assess whether a program can transform markets the following information is required: (1) Which customer (and market segments) and what market events are targeted by the program; (2) What conditions or features of the market (or market barriers) currently prevent customers from fully seeking and obtaining all cost-effective energy-efficiency products and services in the private, competitive market and why; (3) Whether these conditions can be expected to change (and, if so, in what way) in the absence of the proposed program, including an explanation of why or why not; (4) What activities are proposed for the program, and why and to what extent these activities are expected to reduce or eliminate the market barriers described; (5) What intermediate and/or ultimate indicators will be used to determine to what extent (and why) the program has reduced or eliminated market barriers in a sustainable manner; and (6) What indicators will be used to determine when it is appropriate (and why) to modify or terminate the program.

3.1.3. Balanced Portfolio Criteria (Rule IV-4 and Rule II-6)

The balanced portfolio criteria are based on *Adopted Policy Rules* IV-4 and II-6.

3.1.3.1. Considerations Other than Cost Effectiveness (Rule IV-4)

For individual programs within an administrator's portfolio, cost effectiveness is important, but not the only criteria for eligibility for PGC funds. In addition, other considerations, such those identified in rule II-6 must also be taken into account.

3.1.3.2. Achieving a Balanced Portfolio (Rule II-6)

Achieving the market transformation objectives will require a balanced portfolio of programs that will collectively: (1) Promote a vibrant energy-efficiency products and services industry that can be self-sustaining, without a continuing need for PGC-funded programs; (2) Encourage direct interaction and negotiation between private market participants (including energy-efficiency service providers) and customers, building lasting relationships that will extend into the future; (3) Transform the "upstream" market (e.g., manufacturers, distributors,

[15] Long-lasting, sustainable changes in the structure or functioning of a market are achieved by reducing barriers to the adoption of energy efficiency measures to the point where further publicly-funded intervention is no longer needed in that specific market. A Market Transformation is a reduction in Market Barriers resulting from a Market Intervention, as evidenced by a set of Market Effects, that lasts long after the intervention has been withdrawn, reduced, or changed.

retailers, and builders) so that energy-efficient products and services are made available, promoted, and advertised by private market participants; (4) Be in the broader public interest, with support for activities that would not otherwise be provided by the competitive market (e.g., capturing lost opportunities); (5) Empower customers, especially residential and small commercial customers, with meaningful information on the costs and benefits of energy-efficiency measures; (6) Align the benefits of PGC programs with the customers providing PGC funds; (7) Transform markets in an expeditious manner, in view of the limited time horizon over which PGC funding is guaranteed; and (8) Maximize the societal and in-state energy-efficiency-related benefits achievable through PGC funding.

3.1.4. Incentive Programs Criterion (Rule IV-6)

Programs that involve transactions or exchanges with individual customers must be cost-effective from the participating customer's point of view. This may be demonstrated by showing that these program activities pass the Participant Test (including financial assistance), as defined in the Standard Practice Manual.[16]

3.1.5. SPC Programs Criteria (Rule IV-7)

Programs that provide financial assistance in the form of a Standard Performance Contract shall also have the following design features: (1) An identified element of the energy-efficiency service provider industry that will provide the services, and the certification requirements of the providers; (2) A posted price or prices, expressed as a dollar amount per unit of energy-efficiency service provided; (3) Limitations on the share of program funds that could be received by an individual customer; (4) Limitations on the share of program funds that could be received by an individual energy-efficiency service provider; (5) Fully developed minimum requirements for customer contract language regarding terms and conditions for performance for the service provider (e.g., measurement and verification procedures, equipment maintenance, and financial transactions between the customer and the service provider); and (6) An identified process for addressing and resolving customer complaints associated with the contract between the customer and the service provider, including an identified role for the Administrator in the dispute resolution process.

3.1.6. Related CPUC Activities Criteria (Rule IV-8)

Programs shall also be designed to facilitate coordination, as appropriate, with related activities, including: (1) The electricity Customer Education Plan; (2) The Electric Education Trust; (3) The CPUC outreach and education efforts; (4) PGC-funded low income activities; (5) PGC-funded renewable energy activities; (6) PGC-funded research, development, and demonstration of energy-efficiency activities; (7) Local, state, regional, and federal energy-efficiency programs, such as regional market transformation activities; and (8) Local, state, and federal energy-efficiency laws and standards.

[16] CPUC/CEC. *Standard Practice Manual for Economic Analysis of Demand-Side Management Programs.* December, 1987.

3.2. Methodology for Applying the Criteria

This section provides the methodology for applying the criteria listed in section 3.1. The methodology consists of answering a set of questions for each criterion. The questions used to assess the programs in terms of the criteria are based on restating the criteria in question form. Some additional questions are included as part of our interpretation of the criterion. The answers to these questions (when available) are judged using the rules defined in section 3.3, and recommendations are made according to the matrix presented in section 3.3.5. This methodology is used to assess each program group from the list of "like" new and existing 1998 programs in California, and other states as well as proposed program concepts provided.

The *Adopted Policy Rules* place more importance[17] on programs that are cost-effective, and provide a clearly defined plan for transforming markets for energy efficiency in a self-sustaining way. Our methodology therefore places primary importance on recommending programs that meet these criteria. Program assessments and recommendations by administrator area are provided in chapters 4, 5, and 6. Assessments and recommendations are based on the program summaries contained in Appendix B. Each program assessment and recommendation includes information regarding the potential for cost-effectiveness, market transformation, program balance, incentive programs, SPC programs, and related CPUC activities. Also included are program design recommendations regarding implementation, integration, and incentive levels (where applicable).

The methodology does not incorporate the balanced portfolio criteria described above. We make no attempt to assess a portfolio of programs. To do so would require allocating budgets to each program, which is beyond the scope of this report. Programs are recommended, based on the cost effectiveness and market transformation criterion. Balanced portfolio information is provided for each program, but no judgement can be made regarding the how a program contributes to a balanced portfolio until the portfolio is selected. Therefore the final matrix in this chapter does not have a balanced portfolio column.

We can suggest some of the desirable properties of rules for assembling a portfolio of programs, even if we can not fully develop or apply them in this report. Consider the simple example of a rule that trades off cost effectiveness for equity (income balance) in program selection. In this case a program that improves equity, because of this balanced income portfolio criterion, would be favored over programs that did not. More generally, a program that improved portfolio balance along any of the axes listed in 3.1.3.2 should be added to the portfolio before a program with the same cost effectiveness that did not contribute to portfolio balance.

3.2.1. Methodology for Assessing Cost Effectiveness (Rule IV-1 and IV-3)

The methodology for assessing cost effectiveness requires answering the following questions.

a) Does the program provide the Public Purpose Test (PPT), Total Resource Cost (TRC) Test, Utility Cost Test, levelized cost of saved energy, or a description of annual and/or lifetime energy and peak demand savings that can be used to calculate cost effectiveness? Does the

[17] Refer to *Adopted Policy Rules for Energy Efficiency Activities*. Rules IV-1, IV-2, IV-3, IV-5, and II-4. CPUC Decision 98-04-063.

program provide a description of non-energy benefits, such as improvements in productivity? Does the program provide a description of externality benefits such as reductions in emissions?

b) Does the program provide evidence for cost-effectiveness? Evidence for existing programs will include measurement and evaluation (M&E) studies or other studies. Evidence for new programs or new program concepts will include studies of energy use by market segment, projected market penetration and the anticipated demand response, as well as estimates of energy savings. New programs were first implemented by California utilities in 1998. New programs will have less evidence available from M&E and market effects studies to support cost-effectiveness and the market transformation plan.

3.2.2. Methodology for Assessing the Market Transformation Plan (Rule IV-2 and Rule II-5), the Reduction or Elimination of Market Barriers (Rule II-4), and Market Transformation Characteristics and Assessment (Rule IV-5)

The methodology for assessing the market transformation plan, the reduction or elimination of market barriers, and market transformation assessment, requires answering the following questions.

a) Does the program have a clearly defined plan for transforming markets for energy efficiency in a self-sustaining way?
b) What conditions or features of the market (or market barriers) currently prevent customers from fully seeking and obtaining all cost-effective energy-efficiency products and services in the private, competitive market and why?
c) What activities are proposed for the program, and why and to what extent are these activities expected to reduce or eliminate the market barriers described?
d) Which customer (and market segments) and what market events are targeted by the program?
e) Do market services provided to market actors address the key market barriers?
f) Does the program provide an indication of how the market is changing and how these changes would affect the adoption of the energy-efficient product, service or practice if there were no PGC-funded program?
g) How can/has each of the important underlying assumptions be tested or evaluated before, during, or after program operation?
h) Does the program plan provide definitive indicators that can be used to determine when the program no longer needs PGC funds?
i) What intermediate and/or ultimate indicators will be used to determine to what extent (and why) the program has reduced or eliminated market barriers in a sustainable manner?
j) What indicators will be used to determine when it is appropriate (and why) to modify or terminate the program?

3.2.3. Methodology for Assessing a Balanced Portfolio (Rule IV-4 and Rule II-6)

The methodology for assessing contribution to a balanced portfolio requires answering the following questions, based on the *Adopted Policy Rules.*

a) Does the program contribute to a balanced portfolio of programs as defined in Rule II-6?
b) Does the program promote a vibrant energy-efficiency products and services industry that can be self-sustaining without a continuing need for PGC-funded programs?

c) Does the program encourage direct interaction and negotiation between private market participants (including energy-efficiency service providers) and customers, building lasting relationships that will extend into the future?
d) Does the program transform the "upstream" market (e.g., manufacturers, distributors, retailers, and builders) so that energy-efficient products and services are made available, promoted, and advertised by private market participants?
e) Is the program in the broader public interest, with support for activities that would not otherwise be provided by the competitive market (e.g., capturing lost opportunities)?
f) Does the program empower customers, especially residential and small commercial customers, with meaningful information on the costs and benefits of energy-efficiency measures?
g) Does the program transform markets in an expeditious manner, in view of the limited time horizon over which PGC funding is guaranteed?
h) Does the program maximize (or leverage) societal and in-state energy-efficiency-related benefits achievable through PGC funding?
i) Does the program (or elements thereof) need to be integrated[18] within an administrator area and/or across administrator areas?

An attempt is made to indicate each individual program's contribution to a balanced portfolio based on the *Adopted Policy Rules*. However, no attempt is made to assess the programs on the basis of portfolio balance, and no attempt has been made to consider portfolios of programs.

3.2.4. Methodology for Assessing Incentive Programs (Rule IV-6)

The methodology for assessing incentive programs requires an answer to a single question.
a) If the program involves incentives or financial exchanges, are these cost-effective from the participating customer's point of view? This may be demonstrated by showing that these program activities pass the Participant Test (including financial assistance), as defined in the Standard Practice Manual. Information required to calculate the participant test might not be available for relevant programs.

3.2.5. Methodology for Assessing SPC Programs (Rule IV-7)

The methodology for assessing SPC programs requires answering the following questions.
If the program is an SPC-type program, does it meet all requirements specified under Rule IV-7 (see above)?
a) Does the program identify an element of the energy-efficiency service provider industry that will provide the services and the certification requirements of the providers?
b) Are posted prices provided, expressed as a dollar amount per unit of energy-efficiency service?
c) Are there limitations on the share of program funds that could be received by an individual customer?
d) Are there limitations on the share of program funds that could be received by an individual energy-efficiency service provider?

[18] Integration is defined as programs (or program elements) that are formally linked by design and implementation.

e) Is there a fully developed minimum requirement for customer contract language regarding terms and conditions for performance for the service provider (e.g., measurement and verification procedures, equipment maintenance, and financial transactions between the customer and the service provider)?
f) Does the program identify a process for addressing and resolving customer complaints associated with the contract between the customer and the service provider, including an identified role for the Administrator in the dispute resolution process?

3.2.6. Methodology for Assessing Related CPUC Activities (Rule IV-8)

The methodology for assessing related CPUC activities requires answers to the following questions.

a) Does the program facilitate coordination, as appropriate, with related CPUC activities, including: (1) The Electricity Customer Education Plan; (2) The Electric Education Trust; (3) The CPUC outreach and education efforts; (4) PGC-funded low income activities; (5) PGC-funded renewable energy activities; (6) PGC-funded research, development, and demonstration energy-efficiency activities; (7) Local, state, regional, and federal energy-efficiency programs, such as regional market transformation activities; and (8) Local, state, and federal energy-efficiency laws and standards?

3.3. Rules for Making Program Recommendations

The rules for making program recommendations are based on the methodology described in section 3.2 using the criteria described in section 3.1. The rules for judging program assessments are described in sections 3.3.1 through 3.3.4. The rules for making program recommendations are described in section 3.3.5, and that section concludes with a matrix summarizing the rules for program recommendations provides in chapters 4-6. Again, recommendations are based on how well each program meets the criteria described in section 3.1. And again, the *Adopted Policy Rules* only require the portfolio of programs to be cost effective, not that each individual program be cost effective. Therefore, these recommendations should not be interpreted as a hurdle for individual programs. Rather, these recommendations provide an indication of how well each program and program assessment meets the criteria of providing evidence to support cost effectiveness and market transformation.

3.3.1. Rules for Judging Cost Effectiveness

Each program's potential cost effectiveness is judged based answering to two sets of questions provided in section 3.2.1.

1) Does the program provide the Public Purpose Test (PPT), Total Resource Cost (TRC) Test, Participant Test, Utility Cost Test, levelized cost of saved energy or a description of annual and lifetime energy and peak demand savings that can be used to calculate cost effectiveness? Does the program provide a description of non-energy benefits such as improvements in productivity? Does the program provide a description of externality benefits such as reductions in emissions?
2) Does the program provide evidence for cost-effectiveness? Evidence for existing programs will include measurement and evaluation (M&E) studies or other studies. Evidence for new programs or new program concepts will include studies of energy use by market segment, projected market penetration and the anticipated demand response, as well as estimates of

energy savings. New programs were first implemented by California utilities in 1998. New programs will have less evidence available from M&E and market effects studies to support cost-effectiveness and the market transformation plan.

Each set of cost-effectiveness questions is judged using the following rules:
1) Strong, moderate or weak cost effectiveness; and
2) Strong, limited or no evidence is provided to support the cost-effectiveness calculations.

Judging Cost Effectiveness

The rules for judging cost effectiveness should be based on the PPT. However, no PPT information is available. For existing programs, judgments regarding cost effectiveness are based on TRC Test information. For new programs, judgments regarding cost effectiveness are based on energy savings and other cost effectiveness indicators such as estimates of the TRC Test, Participant Test, Utility Cost Test, and the levelized cost of saved energy. [19]

Existing Programs

For existing programs, TRC tests from utility programs are used to provide an indication of potential cost effectiveness.[20] For programs comprised of more than one utility program, the range of TRC tests is provided along with a "program-budget-weighted" TRC. An existing program's potential for cost effectiveness is judged as follows:
1) Strong, if program-budget-weighted TRC tests are greater than or equal to 1.5;
2) Moderate, if program-budget-weighted TRC tests are greater than or equal to 1 and less than 1.5;
3) Weak, if program-budget-weighted TRC tests are less than 1; and
4) No Information.

Note that no effort is made to assess the merit of utility program TRC test information.

New Programs

For new programs estimated annual energy savings and other cost effectiveness indicators are used such as estimates of the TRC Test, Participant Test, Utility Cost Test, and levelized cost of saved energy. A new program's potential for cost effectiveness is judged as follows:
1) Strong, if benefit-to-cost ratio is greater than or equal to 1.5;
2) Moderate, if benefit-to-cost ratio is greater than or equal to 1 and less than 1.5;
3) Weak, if benefit-to-cost ratio is less than 1; and
4) No Information.

[19] Existing programs were implemented in California and other states prior to 1998. New programs were first implemented in 1998. New concepts have not yet been implemented, and were provided through public comment.

[20] While the Total Resource Cost (TRC) test does not use the societal discount rate, the TRC test as used by California utilities often includes environmental adders and transmission and distribution costs. Thus, while the PPT has not been calculated for these existing programs, the TRC test, when available, can be a reasonably good indicator of whether a program is likely to pass the PPT. However TRC test information is not available for all program concepts. No effort is made to assess the merit of utility program TRC test information. Current practices used to calculate TRC tests reported in the California Utility Application Filings include environmental externalities and transmission and distribution costs. This is not consistent with the strict definition of TRC given in the *Standard Practice Manual: Economic Analysis of Demand-Side Management Programs*. California Public Utility Commission and the California Energy Commission. CEC P400-87-006. December 1987.

Judging Evidence for Cost Effectiveness

Judgements regarding evidence for cost effectiveness are made in terms of the quality of the information and calculations provided depending on whether or not the program is existing or new.

Existing Programs

Strong evidence is attributed if cost effectiveness is based on M&E studies. Limited evidence is attributed if cost effectiveness is based on projected savings or extrapolations from prior M&E studies with a related, but different program design. No evidence is attributed where no studies are provided to support the cost effectiveness information.

New Programs

Strong evidence is attributed if the following information is provided: overall energy use in the market segment; estimates of how many customers are going to be reached; how many customers will take action; and potential energy savings resulting from such actions. Limited evidence is attributed if overall energy use in the market segment is provided, and limited or no information is provided regarding estimates of how many customers are going to be reached, how many customers will take action, and potential energy savings resulting from such action. No evidence is attributed if no evidence is provided to support the cost effectiveness or annual energy savings information.

3.3.2. Rules for Judging the Potential for Market Transformation

The potential for market transformation is based on judging the answers to the questions provided in section 3.2.2. Each program's potential for transforming markets for energy efficiency in a self-sustaining way is judged by answering two meta-questions:

1) How convincing is the market transformation plan based on the answers to six questions asked in section 3.2.2 (i.e., questions a, c, d, e, g, and h); and
2) How much evidence is provided to support the theorized market effects based on the answers to four questions asked in section 3.2.2. (i.e., questions b, f, i, and j).

Each meta-question is judged using the following rules:

1) Strong, moderate or weak market transformation plan; and
2) Strong, limited or no evidence is provided regarding how the market is changing[21] and regarding market effects.

Judging Meta-Question #1

Judgments regarding the market transformation plan are made in terms of both design and implementation.[22] Judgments are based on the quality of information provided regarding proposed activities, customer segments, market events, underlying assumptions, and indicators of program

[21] Descriptions of how the market is changing are found in the program summary templates (see Appendix B and Chapter 3, Table 3.2 Program Summary Template, part B. Market Transformation Characteristics). Evidence regarding how the market is changing includes the degree of privatization. Note that information regarding the degree of privatization is not generally available.

[22] Judgments regarding the market transformation plan for new programs are based only on design.

performance. A strong plan will provide a convincing description of customer segments, market barriers, market events, activities to reduce market barriers, as well as underlying assumptions,[23] and indicators of program performance (i.e., market penetration, demand response, and resultant savings[24]). A moderate plan has a less-convincing description and less information (typically no indicators of program performance are provided). A weak plan has a lesser-convincing description and even less information, no underlying assumptions, and no indicators of program performance.

Judging Meta-Question #2

Judgments regarding evidence are weighted more towards *evidence regarding market effects* rather than *evidence regarding how the market is changing*. Strong evidence is assigned only if there is strong *evidence regarding market effects,* even if there is only limited *evidence how the market is changing*. Limited evidence is assigned if at least limited evidence is provided for market effects, even if no evidence is provided for *how the market is changing.* No evidence is assigned only if no evidence is provided for both *how the market is changing* and *market effects.*

3.3.3. Rules for Judging the Potential for Contributing to a Balanced Portfolio

The potential for contributing to a balanced portfolio can only be assessed when the program portfolio is selected. Therefore, the balanced portfolio criterion is not taken into account in this study, which evaluates each program separately. Rather, a pass/fail assessment is made of each program's potential contribution to a balanced portfolio, but no attempt is made to judge the quality of that contribution relative to each of the other programs. Tables 4.1.3, 5.1.3, and 6.1.3 provide a summary of each program's contribution to a balanced portfolio.

3.3.4. Rules for Judging the Other Criteria

The rules used to judge the other criteria are described below.

3.3.4.1. Rule for Judging the Incentive Programs

The incentive programs either pass the Participant Test or do not.

3.3.4.2. Rule for Judging the SPC Programs

The SPC programs either meet the SPC program design requirements or do not.

3.3.4.3. Rule for Judging the Related CPUC Activities

The programs either contribute to related CPUC activities or do not.

3.3.5. Rules for Making Program Recommendations

Program recommendations are based on how well each program meets the Criteria described in section 3.1. Program recommendations are provided as an aid in selecting the program portfolio for each administrator area. They should not be interpreted as a hurdle for each program. Rather they provide an indication of how well each program meets the criteria in terms of providing

[23] Descriptions of underlying assumptions are typically provided in the program summary templates (see Appendix B and Chapter 3, Table 3.2 Program Summary Template, part D. Program Assessment Information).

[24] Descriptive indicators of program performance are found in Section C of the program summary templates (see Appendix B and Chapter 3, Table 3.2 Program Summary Template, part C. Indicators of Program Performance).

descriptive information and evidence to support cost effectiveness, potential for market transformation, and other criteria for incentive programs, SPC program, and CPUC related activities. The following six rules are used to make recommendations for existing and new programs. Table 3.3.5 provides a matrix showing how the rules are applied.

1) *Highly recommended*, if all relevant criteria assessments are strong and the program passes all applicable incentive-program, SPC-program, and CPUC-related activities (hereafter referred to as "other criteria").
2) *Recommended*, if cost effectiveness is moderate, evidence supporting cost effectiveness is limited, market transformation plan is moderate, evidence for market effects is limited, and the program passes or is expected to pass all other criteria. Or for new programs only, if no cost effectiveness information is provided, evidence supporting cost effectiveness is strong, market transformation plan is strong, evidence for market effects is limited, and the program passes or is expected to pass all other criteria, then the same rating results.
3) *Recommended pending cost-effectiveness evaluation*, if cost effectiveness is at least moderate, no evidence is provided to support cost effectiveness, or if cost-effectiveness information is completely unavailable, the market transformation plan is moderate, no evidence is provided for market effects, and the program passes or is expected to pass all other criteria.
4) *Recommended pending further study*, if cost effectiveness is at least moderate, no evidence is provided to support cost effectiveness, or if cost-effectiveness information is unavailable, the market transformation plan is at least moderate, no evidence for market effects is provided, and the program passes or is expected to pass all other criteria.
5) *Merits consideration with redesign*, if cost effectiveness is weak, evidence supporting cost effectiveness is limited, the market transformation plan is moderate, no evidence is provided (or the market transformation plan is weak but evidence for market effects is at least limited), and the program passes or is expected to pass all other criteria.
6) *Does not meet criteria*, if cost effectiveness is weak (or no information provided), limited evidence is provided supporting cost effectiveness, the market transformation plan is weak and no evidence for market effects is provided. Alternatively, if there is strong evidence that a program is not cost effective, and either the market transformation plan is moderate and no evidence is provided, or the market transformation plan is moderate but evidence for market effects is no more than limited, then the same rating results. A programs may also be designated *Does not meet criteria* if it is a single-year program or study and the program is essentially finished in PY98, or if the program is not particularly relevant to California.

Table 3.3.5 Rules for Making Recommendations for Existing and New Programs

Recommendation	Criteria for Program Assessment			
	Cost Effectiveness Potential (S, M, W, or N)	**Evidence Supporting Cost Effectiveness** (S, L, N)	**Market Transformation Plan** (S, M, W)	**Evidence Supporting MT Plan** (S, L, N)
Highly recommended	S	S	S	S
Recommended	M	L	M	L
(or new programs only)	N	S	S	L
Recommended Pending cost-effectiveness evaluation	M or N	N	M	L
Recommended pending further study	M or N	N	M	N
Merits consideration with redesign	W	L	M	N
(or)	N	N	W	L
(or)	W	L	W	L
Does not meet criteria	W or N	N	W	N
(or)	W	S	M	N
(or)	W	S	W	L

Notes:
1. S = Strong; M = Moderate; W = Weak; N = No Information; and L = Limited (evidence).
2. Rules are in weak order of precedence.
3. Table provides minimum necessary criteria ratings to achieve each recommendation. To apply table, assemble criteria ratings and step down recommendations until minimum necessary ratings are first met or exceeded. The last row can be an exception to this algorithm, when strong evidence that a program is not cost effective makes it more likely that the program does not meet criteria.

4. Nonresidential Program Administrator Area

This chapter contains the following sections:

- Nonresidential Program Recommendations, Services Provided to Market Actors, Program Summary Tables, and Balanced Portfolio Contribution; and
- Nonresidential Program Assessments.

4.1. Nonresidential Program Recommendations, Services Provided to Market Actors, Program Summary Tables, and Balanced Portfolio Contribution

This section provides a summary of recommendations for each of the 28 Nonresidential Programs. The rules in Section 3.3.5 are used to make program recommendations. Recommendations are listed below and summarized in Table 4.1.1. This section also includes a summary of program services provided to market actors in Table 4.1.2, program summary tables of end uses, technologies, services, practices, market events, customer/building type, and PY98 budget in Table 4.1.3, and a summary of each program's contribution to a balanced portfolio in Table 4.1.4.

4.1.1. Highly Recommended Programs

The following program is highly recommended:

- Large Commercial/Industrial/Agricultural Downstream Incentives Program.

4.1.2. Recommended Programs

The following programs are recommended:

- Small Commercial Customer Surveys and Audits Program
- Large Commercial/Industrial/Agricultural Customer Surveys and Audits Program;
- Nonresidential Standard Performance Contract (NSPC) Program;
- Small Commercial "Downstream" Incentives Program;
- Nonresidential "Upstream" Package AC Distributor Incentives;
- Nonresidential "Upstream" Motors Incentives;
- Nonresidential "Upstream" LED Exit Sign Incentives;
- Implementation Assistance Program;
- LED Traffic Signals Standards Program;
- Hotel and Motel Efficient Technologies Demonstration Program;
- Vendor Linkages to Customers Program.
- Local Government and Community Energy Efficiency Program;
- Integrated Small Commercial Energy Efficiency Program (New Program Concept);
- California Industrial Solutions (New Concept); and
- Integrated Irrigation System Operation (New Concept).

4.1.3. Programs Recommended Pending Cost-Effectiveness Evaluation

The following programs are recommended pending cost-effectiveness evaluation and may need redesign in order to improve cost effectiveness:

- Corporate Energy Benchmarking;

- Energy Efficiency Centers; and
- Food Service Equipment Center.

4.1.4. Programs Recommended Pending Further Study

The following programs are recommended pending further study:

- Daylighting Productivity Study; and
- Microelectronics Industry Efficiency Initiative;
- Silicon Crystal Growing Facilities Program; and
- Energy Efficiency and Property Valuation Study.

4.1.5. Programs that Merit Consideration with Redesign

The following programs merit consideration with redesign to improve cost-effectiveness (which may involve integration with other programs):

- Customer Information Program;
- Building Recommissioning Program; and
- Lighting Controls Demonstration Program;

4.1.6. Programs (or Program Concepts) That Do Not Meet Assessment Criteria

The following programs do not meet the assessment criteria defined in Sections 3.1, 3.2, and 3.3:

- Facility Engineer Training Program; and
- Nonresidential Financing Program.

4.1.7. Services Provided to Market Actors and Program Summary Tables

A summary of nonresidential program services provided to market actors is shown in Table 4.1.2. This summary table shows both the services provided to market actors as well an indication of which actors provide these services.[25] A summary of nonresidential program end uses, technologies, services, practices, market events, customer/building type, and PY98 budget is shown in Table 4.1.3.

4.1.8. Summary of Contribution to Balanced Portfolio

Each program's contribution to a balanced portfolio and cross-cutting programs that overlap more than one Administrator are shown in Table 4.1.4. The potential for contributing to a balanced portfolio can only be assessed when the program portfolio is selected. A pass/fail assessment is made of each program's potential contribution to a balanced portfolio, but no attempt is made to judge the quality of that contribution relative to each of the other programs.

The following cross-cutting programs overlap more than one Administrator:

- Energy Efficiency Centers (nonresidential retrofit, residential retrofit, and new construction);
- Food Service Equipment Center (nonresidential retrofit and new construction);
- Nonresidential "Upstream" Package AC Distributor Incentives (nonresidential retrofit and new construction);

[25] Market actors providing services are not identified for programs where the services are provided by interim administrator staff .

- Nonresidential "Upstream" Motors Incentives (nonresidential retrofit and new construction);
- Nonresidential "Upstream" LED Exit Sign Incentives (nonresidential retrofit and new construction);
- Lighting Controls Demonstration Program (nonresidential retrofit and new construction);
- Vendor Linkages to Customers Program (nonresidential retrofit, residential retrofit, and new construction).
- Energy Efficiency and Property Valuation Study (nonresidential retrofit and new construction); and
- Local Government and Community Energy Efficiency Program (nonresidential retrofit, residential retrofit, and new construction).

Table 4.1.1. Summary of Nonresidential Program Assessment and Recommendations

Program Name	Existing, New 3rd-Party, Out-of-State	Cost Effectiveness	Market Transformation	Other Criteria	Recommendation
1) Corporate Energy Benchmarking	Existing	No Information	Moderate Plan, Limited Evidence	N/A	Recommended pending cost-effectiveness evaluation
2) Customer Information Program	Existing	No Information	Weak Plan, Limited Evidence	Supports CPUC Activities	Merits consideration with redesign
3) Small Commercial Customer Surveys and Audits Program	Existing	Moderate TRC, Strong Evidence	Strong Plan, Limited Evidence	N/A	Recommended
4) Large Commercial/Industrial/Agricultural Customer Surveys and Audits Program	Existing	Moderate TRC, Strong Evidence	Strong Plan, Limited Evidence	N/A	Recommended
5) Energy Efficiency Centers	Existing	No Information	Strong Plan, Limited Evidence	Supports CPUC Activities	Recommended, pending cost effectiveness evaluation
6) Building Recommissioning Program	New PY98 & 3rd-party	No Information	Weak Plan, No Evidence	N/A	Merits consideration with redesign
7) Facility Engineer Training Program	New PY98 & out-of-state	No Information	Weak Plan, No Evidence	N/A	Does not meet criteria
8) Food Service Equipment Center	Existing	No Information	Strong Plan, Limited Evidence	N/A	Recommended, pending cost-effectiveness evaluations
9) Nonresidential Financing Program	New PY98	No Information	Weak Plan, No Evidence	N/A	Does not meet criteria
10) Nonresidential Standard Performance Contract (NSPC) Program	New PY98	Strong TRC, Strong Evidence	Strong Plan, Limited Evidence	Meets all SPC program requirements	Recommended
11) Small Commercial "Downstream" Incentives Program	Existing	Moderate TRC, Strong Evidence	Strong Plan, Strong Evidence	No Participant Test data but anticipated cost-effective	Recommended

Table 4.1.1. Summary of Nonresidential Program Assessment and Recommendations (continued)

Program Name	Existing, New 3rd-Party, Out-of-State	Cost Effectiveness	Market Transformation	Other Criteria	Recommendation
12) Large Commercial/Industrial/Agricultural "Downstream" Incentives Program	Existing	Strong TRC, Strong Evidence	Strong Plan, Strong Evidence	No Participant Test data but anticipated cost-effective	Highly recommended
13) Nonresidential "Upstream" Package AC Distributor Incentives	New PY98	Moderate TRC, Strong Evidence	Strong Plan, Limited Evidence	N/A	Recommended
14) Nonresidential "Upstream" Motors Incentives	New PY98	Moderate TRC, Strong Evidence	Moderate Plan, Limited Evidence	N/A	Recommended
15) Nonresidential "Upstream" LED Exit Sign Incentives	New PY98	Moderate TRC, Strong Evidence	Strong Plan, Limited Evidence	N/A	Recommended
16) Implementation Assistance Program	Existing	Strong TRC, Strong Evidence	Moderate Plan, Limited Evidence	Supports EPAct Implementation	Recommended
17) LED Traffic Signals Standards Program	New PY98	No Information, Strong Evidence	Strong Plan, Limited Evidence	N/A	Recommended
18) Hotel and Motel Efficient Technologies Demonstration Program	New PY98	No Information, Strong Evidence	Strong Plan, Limited Evidence	N/A	Recommended
19) Lighting Controls Demonstration Program	New PY98	No Information	Weak Plan, Limited Evidence	N/A	Merits consideration with redesign
20) Daylighting Productivity Study	3rd-party & out-of-state	No Information	Moderate Plan, No evidence	N/A	Recommended pending further study

Table 4.1.1. Summary of Nonresidential Program Assessment and Recommendations (continued)

Program Name	Existing, New 3rd-Party, Out-of-State	Cost Effectiveness	Market Transformation	Other Criteria	Recommendation
21) Microelectronics Industry Efficiency Initiative	Out-of-state	No Information	Moderate Plan, No evidence	N/A	Recommended pending further study
22) Silicon Crystal Growing Facilities Program	Out-of-state	No Information	Moderate Plan, No evidence	N/A	Recommended pending further study
23) Vendor Linkages to Customers Program	New PY98 & 3rd-party	No Information, Strong Evidence	Strong Plan, Limited Evidence	N/A	Recommended
24) Energy Efficiency and Property Valuation Study	3rd-party	No Information	Moderate Plan, No Evidence	N/A	Recommended pending further study
25) Local Government and Community Energy Efficiency Program	3rd-party & out-of-state	Strong Benefit-Cost Ratio, Limited Evidence	Strong Plan, Limited Evidence	Supports local energy efficiency efforts and laws	Recommended
26) Integrated Small Commercial Energy Efficiency Program	New concept	Strong benefit-to-cost ratio, Strong Evidence	Strong Plan, Limited Evidence	No Participant Test data but anticipated cost-effective	Recommended
27) California Industrial Solutions (New Program Concept)	New concept	No benefit-to-cost ratio, Strong Evidence	Strong Plan, Limited Evidence	No Participant Test data but anticipated cost-effective	Recommended
28) Integrated Irrigation System Operation (New Program Concept)	New concept	No benefit-to-cost ratio, Strong Evidence	Strong Plan, Limited Evidence	No Participant Test data but anticipated cost-effective	Recommended

* CCE = Cost of Conserved Energy

Table 4.1.2. Summary of Nonresidential Program Services Provided to Market Actors

Program Name	Building Owners, Operators	Designer, Specifiers, Engineers	Contractors	Retailers, Vendors	Distributors	Manufacturers	Lending Agents	Other:
1) Corporate Energy Benchmarking	• Energy benchmarking • Website							
2) Customer Information Program	• Information, advertising, website, hotline							
3) Small Commercial Customer Surveys and Audits Program	• Energy surveys & audits							
4) Large CIA Customer Surveys and Audits Program	• Energy surveys & audits	• Perform surveys/audits						
5) Energy Efficiency Centers	• Training & tools, demos • Information, advertising, Websites	• Training & tools, demos • Information, advertising, Websites	• Training & tools, demos • Information, advertising, Websites					
6) Building Recommissioning Program (includes a 3rd Party program)	• Training & tools, tune-up • Information		• Provide training & tune-ups					
7) Facility Engineer Training Program	• Training & certification							
8) Food Service Equipment Center	• Information • Training • Demos	• Information • Training • Demos				• Information • Training • Demos		**Industry:** • ASTM test methods
9) Nonresidential Financing Program	• Financial assistance • Audits						• Provide loans	
10) Nonresidential Standard Performance Contract (NSPC) Program	• NSPC Incentives	• NSPC Incentives	• NSPC Incentives					**ESCOs, EESPs:** • NSPC Incentives

Table 4.1.2. Summary of Nonresidential Program Services Provided to Market Actors (continued)

Program Name	Building Owners, Operators	Designer, Specifiers, Engineers	Contractors	Retailers, Vendors	Distributors	Manufacturers	Lending Agents	Other:
11) Small Commercial "Downstream" Incentives Program	• Information • Incentives		• Information, advertising					
12) Large CIA "Downstream" Incentives Program	• Information • Incentives		• Information, advertising					
13) Nonresidential "Upstream" Package AC Distributor Incentives	• Information				• Information, advertising • Incentives			
14) Nonresidential "Upstream" Motors Incentives	• Information • Labeling • Point of sale discounts			• Information, advertising • Training • Incentives	• Stocking and handling incentives	• Alliances • Standards		
15) Nonresidential "Upstream" LED Exit Sign Incentives	• Information • Labeling				• Information, advertising • Promotional allowances	• Wholesale cost reduction		
16) Implementation Assistance Program (includes several 3rd Party program)	• Project assistance services	• Provide project management					• Provide financing	
17) LED Traffic Signals Standards Program	• Information • Labeling					• Standards, labeling		**Municipal Governments:** • Standards, assist finding financing
18) Hotel and Motel Efficient Technologies Demonstration Program	• Information • Demos • Financial help							
19) Lighting Controls Demonstration Program	• Information, Websites, • Demos	• Information • Training & tools				• Provide standards, protocols		
20 Daylighting Productivity Study (includes a 3rd Party program)	• Information • Demos • Project assistance	• Information • Provide demos				• Information		

Table 4.1.2. Summary of Nonresidential Program Services Provided to Market Actors (continued)

Program Name	Building Owners, Operators	Designer, Specifiers, Engineers	Contractors	Retailers, Vendors	Distributors	Manufacturers	Lending Agents	Other:
21) Microelectronics Industry Efficiency Initiative	• Information • Demos • Project Assistance, 3rd party experts	• Information • Training • Demos • Project assistance				• Information • Audits & surveys • Design service • Financial help		
22) Silicon Crystal Growing Facilities Program		• Demos • Project assistance				• Demos • Training & tools • Project assistance		**Siemens:** • Financial help • Provide demos
23) Vendor Linkages to Customers Program (includes a 3rd Party program)	• Information, Websites • Links to contractors, vendors, distributors, & manufacturers	• Advertising, Websites • Links to customers, vendors, distributors, & manufacturers	• Advertising, Websites • Links to customers	• Advertising, Websites • Training & tools • Links to customers	• Advertising, Websites • Links to customers	• Advertising, Websites • Links to customers		
24) Energy Efficiency and Property Valuation Study (includes a 3rd Party program)	• Information, survey study						• Information, survey study	**Appraisers, Realtors, Investors:** • Information, survey study **Govt't:** • Policy guidelines
25) Local Government and Community Energy Efficiency Program	• Information • Training & tools • Project assistance							**Local Gov'ts:** • Information • Training & tools • Provide assistance

Table 4.1.2. Summary of Nonresidential Program Services Provided to Market Actors (continued)

Program Name	Building Owners, Operators	Designer, Specifiers, Engineers	Contractors	Retailers, Vendors	Distributors	Manufacturers	Lending Agents	Other:
26) Integrated Small Commercial Energy Efficiency Program (New Concept)	• Information • Audits • Financing & incentives • Project design assistance	• Provide subsidized project design assistance						**Local Gov'ts:** • Information
27) California Industrial Solutions (New Concept)	• Information, demos • Subsidized technical assistance	• Provide subsidized technical assistance	• Provide subsidized technical assistance					**Regulatory Agency (CEC):** • Provide compliance examples & technical support
28) Integrated Irrigation System Operation (New Concept)	• Information • Tools, & training • Demos • Financial incentives • Project assistance, 3rd party experts							**DWR, State Universities, ESCOs:** • Provide information, training, tests, tools, project assistance, 3rd party experts

Table 4.1.3. Summary of Nonresidential Program End-Uses, Technologies, Services, Practices, Market Events, Customer/Building Type, and PY98 Budget

Program Name	Energy End-Uses	Technologies, Services, or Practices	Market Event	Customer/ Building Type	PY98 California PGC DSM Budget
1) Corporate Energy Benchmarking	All	Unspecified	**Primary:** retrofit and O&M **Secondary:** equipment purchase	Commercial chain accounts	$250,000
2) Customer Information Program	All (emphasis on space heating and cooling)	All	**Primary:** renovation (without Title 24); **Secondary:** planned replacement, emergency replacement	All nonresidential, (emphasis on small commercial)	$2,470,000
3) Small Commercial Customer Surveys and Audits Program	All (but emphasis on lighting)	All (emphasis on high-efficiency lighting)	Facility retrofit, equipment purchase	All small or medium-size commercial types, but special emphasis on retail, professional services, motels, barber/beauty shops, laundries/dry cleaners, photography services, restaurants, schools, and small health care facilities.	$12,400,000
4) Large Commercial/Industrial/Agricultural Customer Surveys and Audits Program	All (emphasis on lighting and drive power)	All (emphasis on high-efficiency lighting for commercial customers, high-efficiency motors and variable speed drives for agricultural customers)	Facility retrofit, equipment purchase	Large commercial, industrial, agricultural	$8,700,000
5) Energy Efficiency Centers	HVAC, lighting, refrigeration, pumping systems, compressed air, other.	Energy-efficient HVAC, lighting systems, air conditioners, air compressors, water pumps, motors, etc.	Planned replacement, retrofit.	Commercial, industrial, agricultural	$2,800,000

Table 4.1.3. Summary of Nonresidential Program End-Uses, Technologies, Services, Practices, Market Events, Customer/Building Type, and PY98 Budget

Program Name	Energy End-Uses	Technologies, Services, or Practices	Market Event	Customer/ Building Type	PY98 California PGC DSM Budget
6) Building Recommissioning Program	HVAC, lighting	HVAC systems, controls, lighting	**Primary:** building recommissioning and performance analysis; **Secondary:** building retrofit	Large commercial - office buildings, government facilities, hotels, hospitals, laboratory, high tech and bio-tech facilities	$1,700,000
7) Facility Engineer Training Program	All	All (emphasis on HVAC system designs, facility power management, and industrial plant and equipment economics)	**Primary:** daily operations and maintenance; **Secondary:** retrofit and equipment purchase	All non-residential, (focus on medium to large commercial and industrial)	$260,000
8) Food Service Equipment Center	Ventilation, refrigeration, cooking, dishwashing, (food service)	Gas and electric cooking equipment, refrigeration equipment, dishwashers, fans, blowers	Equipment purchase	**Customer:** Small commercial; **Building Type:** restaurants, hotels, institutional food service	$1,900,000
9) Nonresidential Financing Program	All	All	**Primary:** planned replacement; **Secondary:** renovation, retrofit	Small commercial	$400,000
10) Nonresidential Standard Performance Contract (NSPC) Program	HVAC (74%), lighting (20%), other (compressed air, motors, process – 6%)	All Most common are: T-8 fluorescent lamps with electronic ballasts, HVAC controls, chillers, cooling towers, fans, air compressors, variable-speed drives, and motors.	Retrofit, planned replacement, renovation	**Customers:** medium commercial, large commercial and industrial	$42,900,000

Table 4.1.3. Summary of Nonresidential Program End-Uses, Technologies, Services, Practices, Market Events, Customer/Building Type, and PY98 Budget

Program Name	Energy End-Uses	Technologies, Services, or Practices	Market Event	Customer/ Building Type	PY98 California PGC DSM Budget
11) Small Commercial "Downstream" Incentives Program	HVAC, lighting, refrigeration, process systems, and drive power	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.	Retrofit and equipment replacement	**Customers:** Small and medium commercial **Building types:** All	$16,600,000
12) Large Commercial/Industrial/Agricultural "Downstream" Incentives Program	HVAC, lighting, refrigeration, process systems, and drive power	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.	**Primary:** retrofit and equipment replacement; **Secondary:** new construction or renovation with Title-24	Large commercial, industrial, agricultural	$8,100,000

Table 4.1.3. Summary of Nonresidential Program End-Uses, Technologies, Services, Practices, Market Events, Customer/Building Type, and PY98 Budget

Program Name	Energy End-Uses	Technologies, Services, or Practices	Market Event	Customer/ Building Type	PY98 California PGC DSM Budget
13) Nonresidential "Upstream" Package AC Distributor Incentives	Space cooling	High efficiency unitary cooling equipment	**Primary:** equipment replacement, **Secondary:** new construction or renovation with Title-24	All nonresidential, (emphasis on commercial customers/office, retail, warehouse, and school buildings)	$800,000
14) Nonresidential "Upstream" Motors Incentives	Drive power (motors)	Premium efficiency motors (beyond EPACT standards)	Equipment replacement, retrofit	**Customers:** Commercial and industrial; **Building Types:** Industrial	Estimated PY98 California PGC DSM Budget $1,200,000, NEEA Funding is $387,500 per year for 2 years
15) Nonresidential "Upstream" LED Exit Sign Incentives	Lighting exit signs	LED exit signs	Planned replacement, emergency replacement	Small commercial customers	$1,800,000
16) Implementation Assistance Program	HVAC, lighting, refrigeration, miscellaneous	High-efficiency HVAC and lighting.	Retrofit and equipment replacement	**Building Types:** All (emphasis on schools and government-owned office buildings, educational institutions, hospitals, military bases, and correctional facilities)	$1,250,000
17) LED Traffic Signals Standards Program	Traffic lighting	LED traffic lights	**Primary:** retrofit; **Secondary:** new construction	**Customer:** Municipal	$205,000
18) Hotel and Motel Efficient Technologies Demonstration Program	Lighting, HVAC, refrigeration, laundry	High efficiency lighting, high efficiency terminal unit air conditioners, ice machines, vending machines, green plugs, and horizontal axis clothes washers	Retrofit w/o Title 24	**Customers:** Large and medium commercial; **Building Type:** hotels and motels	$140,000

Table 4.1.3. Summary of Nonresidential Program End-Uses, Technologies, Services, Practices, Market Events, Customer/Building Type, and PY98 Budget

Program Name	Energy End-Uses	Technologies, Services, or Practices	Market Event	Customer/ Building Type	PY98 California PGC DSM Budget
19) Lighting Controls Demonstration Program	Lighting	Controls	**Primary:** retrofit w/o invoking Title 24; **Secondary:** new construction	Commercial and industrial	$570,000
20) Daylighting Productivity Study	Lighting	Skylights, dimming ballasts, lighting controls	**Primary:** retrofit; **Secondary:** new construction	**Customer:** Commercial, Industrial, **Building Type:** small and medium office, restaurant, retail, grocery, warehouse, school.	$228,000
21) Microelectronics Industry Efficiency Initiative	Space cooling, heating, ventilation, lighting, drive power, process, other	High efficiency HVAC design, fuel cells, exhaust controls, energy efficient tools, and guides for fabrication lighting, high-efficiency motors and variable-speed drives	Facility retrofit, facility renovation, equipment purchase	**Customer:** Commercial and industrial; **Building Type:** manufacturing, office	NEEA Program Budget $1.43 million over three years
22) Silicon Crystal Growing Facilities Program	Process, other	High efficiency crystal-growing furnaces	Facility retrofit, facility renovation, equipment purchase	**Customers:** commercial and industrial; **Building Type:** manufacturing, office	NEEA Budget $1 million over three years with matching funds from Siemens Solar
23) Vendor Linkages to Customers Program	All	All	Equipment purchase	All commercial building types and residential customers	$1,000,000
24) Energy Efficiency and Property Valuation Study	All	All	Real estate sales and transactions for both new and exiting construction	Commercial customers and all types of commercial buildings	$143,000 (PG&E 3rd Party program)
25) Local Government and Community Energy Efficiency Program	HVAC, lighting, refrigeration, miscellaneous	All, with emphasis on high-efficiency HVAC, lighting, and refrigerators	Retrofit and equipment replacement	Institutional, small commercial, and residential	$460,000

Table 4.1.3. Summary of Nonresidential Program End-Uses, Technologies, Services, Practices, Market Events, Customer/Building Type, and PY98 Budget

Program Name	Energy End-Uses	Technologies, Services, or Practices	Market Event	Customer/ Building Type	PY98 California PGC DSM Budget
26) Integrated Small Commercial Energy Efficiency Program	HVAC, lighting, controls, water heating, refrigeration, pumps, motors, fans	High efficiency HVAC, lighting, controls, water heating, refrigeration, pumps, motors and/or fans	Retrofit, renovation, planned replacement, emergency replacement, new construction	Customers: Commercial (focus on small, commercial)	New Program Concept (CEC proposes $700,000 budget or $14,000 per customer)
27) California Industrial Solutions (New Program Concept)	HVAC, lighting, refrigeration, process systems, drive power, and industrial process	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.	Acceptance of "systems design" for production	Industrial (emphasis on manufacturing, mining, assembly, oil and gas extraction, industrial service industries)	New Program Concept (CEC proposes $6 million budget)
28) Integrated Irrigation System Operation (New Program Concept)	Irrigation systems	Pumps, irrigation equipment	Equipment optimization, purchase, improved management	Agricultural	New Program Concept (CEC proposes 2-year budget of $560,000)

Table 4.1.4. Summary of Nonresidential Program Balanced Portfolio Contribution

Program Name	Vibrant Energy Efficiency Market	Promotes Direct Interaction	Upstream Market Trans	Broader Public Interest	Empower Small Com/Res Customers	Transforms Markets Expeditiously	Maximize or Leverage Benefits	Cross-Cutting Program
1) Corporate Energy Benchmarking								
2) Customer Information Program								
3) Small Commercial Customer Surveys and Audits Program								
4) Large Commercial/Industrial/Agricultural Customer Surveys and Audits Program								
5) Energy Efficiency Centers								
6) Building Recommissioning Program (includes a 3rd Party program)								
7) Facility Engineer Training Program								
8) Food Service Equipment Center								
9) Nonresidential Financing Program								
10) Nonresidential Standard Performance Contract (NSPC) Program								
11) Small Commercial "Downstream" Incentives Program								
12) Large Commercial/Industrial/Agricultural "Downstream" Incentives Program								
13) Nonresidential "Upstream" Package AC Distributor Incentives								
14) Nonresidential "Upstream" Motors Incentives								
15) Nonresidential "Upstream" LED Exit Sign Incentives								

Table 4.1.4. Summary of Nonresidential Program Balanced Portfolio Contribution (continued)

Program Name	Vibrant Energy Efficiency Market	Promotes Direct Interaction	Upstream Market Trans	Broader Public Interest	Empower Small Com/Res Customers	Transforms Markets Expeditiously	Maximize or Leverage Benefits	Cross-Cutting Program
16) Implementation Assistance Program								
17) LED Traffic Signals Standards Program								
18) Hotel and Motel Efficient Technologies Demonstration Program								
19) Lighting Controls Demonstration Program								
20) Daylighting Productivity Study (consists of a 3rd Party program and an out-of-state program)								
21) Microelectronics Industry Efficiency Initiative (out-of-state program)								
22) Silicon Crystal Growing Facilities Program (out-of-state program)								
23) Vendor Linkages to Customers Program (includes a 3rd Party program)								
24) Energy Efficiency and Property Valuation Study (3rd Party program)								
25) Local Government and Community Energy Efficiency Program (comprised of two 3rd Party programs and an out-of-state program)								
26) Integrated Small Commercial Energy Efficiency Program (New Concept)								
27) California Industrial Solutions (New Concept)								
28) Integrated Irrigation System Operation (New Concept)								

4.2. Nonresidential Program Assessments

The nonresidential program assessments and recommendations are based on the program summaries contained in Appendix B. Each program assessment and recommendation includes information regarding the potential for cost-effectiveness, market transformation, incentive programs, SPC programs, and related CPUC activities. Also included are program design recommendations regarding implementation, integration, and incentive levels (where applicable).

4.2.1. Corporate Energy Benchmarking Program (existing)

Cost Effectiveness

No information is provided regarding cost effectiveness.

Market Transformation Criteria

The program compares energy intensity of similar facilities operated by a chain account customer. The ranking identifies high consuming facilities, draws comparisons to typical competitors, and helps the customer set an overall energy efficiency goal. The service 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.

The market transformation plan is aimed at developing demand for the program through promotion of successful demonstrations at high profile chain account customers. Training and education on how to perform the service is offered to multiple market actors with the intention of developing sustainable market transformation as the service becomes widely available and demand for the service grows. The plan assumes that if energy efficiency opportunities are shown to have a large impact on profits and are presented in the same terms as other investments that financial decision-makers will support energy efficiency investments. Limited evidence is provided to support this assumption as indicated by energy service providers and energy service companies already offering similar benchmarking services to their customers.

The program addresses key market barriers such as information, search, and hassle costs by providing consumers with energy efficiency information tailored to their specific business. The degree to which participating companies use the results to formulate and implement company-wide energy plans will be an 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. 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.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- transforming the "upstream" market by educating energy consultants, engineering firms, ESCOs and other Energy Efficiency Service Providers about benchmarking; and
- empowering commercial customers with meaningful information on the costs and benefits of energy-efficiency measures.

The CEB program is contained within the nonresidential administrator area. The program can stand on its own, or be integrated with other programs.

Incentive, SPC, Related CPUC Activities Criteria

Not applicable.

Recommendation

No cost effectiveness information is provided. The Corporate Energy Benchmarking Program has a moderate market transformation plan with limited evidence. Therefore, the program is recommended pending cost-effectiveness evaluation.

Design Recommendations

The Corporate Energy Benchmarking Program by itself might not merit PGC funding as it is already delivered to some market sectors through private sources. However, the program concept may be a cost-effective tactic for identifying and recruiting candidates for commercial energy efficiency projects. It might be useful to integrate this approach with a program to deliver nonresidential customer energy audits. Further study is recommended to assess the extent to which private energy companies are already providing benchmarking for their customers. This study should also evaluate whether private companies might provide cost-effective delivery for energy audits at commercial facilities.

4.2.2. Customer Information Program (existing)

Cost Effectiveness

Estimates of cost effectiveness are not available.

Market Transformation Criteria

The market transformation objective of the Customer Information Program is to educate a significant portion of nonresidential customers about the added value of energy-efficient products, practices, and services. The program provides information regarding energy-efficient equipment and processes, as well as referrals to other program offerings. It provides this information via Internet web sites, 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. Information is not specific to customer site, but is intended to increase general awareness and understanding of energy-efficiency so customers are more inclined to participate in other programs or take actions on their own. Limited evidence of sustainability is provided by utility field personnel, who report that customers are applying the seminar information to their business operations. No evidence is provided regarding how the market for energy efficiency is changing or how to test important underlying assumptions.

The Customer Information Program addresses key barriers to energy efficiency in the nonresidential market. The most important barriers it addresses are information costs, hassle costs, and asymmetric information or opportunism. Conditions for altering or withdrawing the program will depend upon the degree to which Customer Information Program activities are being provided or funded by other market actors who have nothing to gain from promoting particular products, services, or practices over others. No methods for assessing these conditions are provided.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- encouraging direct interaction and negotiation between private market participants and customers via the customer hotline, vendor referral service, seminars, and exhibits on energy efficiency in order to building lasting relationships that will extend into the future;
- the customer hotline, vendor referral service, seminars, and exhibits on energy efficiency would not otherwise be provided by the competitive market;
- empowering customers, especially small commercial customers, with meaningful information via the customer hotline, vendor referral service, seminars, and exhibits on the costs and benefits of energy-efficiency measures.

Since an educated customer base is considered essential to the success of many energy-efficiency market transformation initiatives, the Customer Information program supports many other programs within the nonresidential administrator area.

Incentive, SPC, Related CPUC Activities Criteria

Incentive and SPC criteria are not applicable. The Customer Information Program facilitates coordination with the Electricity Customer Education Plan, the Electric Education Trust, and CPUC outreach and education activities.

Recommendation

The Customer Information Program can provide a valuable service, particularly to small commercial customers and specialized market segments. It also supports other educational activities of the CPUC. No cost effectiveness information is provided. The Customer Information Program has a weak market transformation plan with limited evidence. Therefore, the program merits consideration.

Design Recommendations

The Customer Information Program should be integrated with incentives or other programs in order to improve design, delivery, and cost effectiveness.

4.2.3. Small Commercial Customer Surveys and Audits Program (existing)

Cost Effectiveness

TRC tests based on measurement and evaluation (M&E) studies were available for three out of four programs within this program group. Cost effectiveness varies widely, but moderate cost effectiveness is suggested by these TRC tests ranging from 0.23 to 2.93 with a program-budget-weighted average TRC of 1.17. Therefore, the program is moderately cost-effective with strong evidence.

Market Transformation Criteria

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 intends 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. Limited evidence is provided regarding how the SCCSA Program will transform the market for energy efficiency in a self-sustaining way or how the market is changing.

The SCCSA Program addresses most of the important market barriers to energy efficiency in the retrofit market, albeit with limited success. A market effects study by Quantum Consulting for SCE[26], indicated largest market effects attributable to audits for HVAC and motors followed by lighting, but the remaining measures (ASD and EMS) had no measurable market effects. The program's underlying assumptions were also described by this study. Program activity shows moderate or little interest by customers for surveys and audits (Edison noted 1% response from 20,000 mailings). SDG&E found small commercial customers reluctant to allow auditors into their facilities. As a result, SDG&E has modified its Small Commercial Audits Program so that customers are contacted by telephone to arrange site visits. SDG&E is also developing a simple Internet audit. Although few small commercial customers have Internet access, this concept merits further consideration. The SCCSA Program could be withdrawn when it becomes clear that other market actors are offering energy audit and surveys without PGC support.

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

Balanced Portfolio Criteria

The SCCSA Program contributes to a balanced portfolio by:

- promoting a vibrant energy-efficiency products and services industry that can be self-sustaining without a continuing need for PGC-funded programs by offering audits, surveys, and information about incentive programs to small commercial customers;
- encouraging direct interaction and negotiation between private market participants (including energy-efficiency service providers) and small commercial customers, building lasting relationships that will extend into the future;
- providing small commercial customers with surveys and audits that would not otherwise be provided by the competitive market; and
- empowering small commercial customers with meaningful information on the costs and benefits of energy-efficiency measures by providing detailed, site-specific audit results.

Incentive, SPC, Related CPUC Activities Criteria

Not applicable.

Recommendation

The SCCSA Program has a strong market transformation plan with limited evidence. The program is moderately cost effective with strong evidence. Therefore, the program is recommended.

Design Recommendations

The SCCSA Program should be integrated with the Small Commercial "Downstream" Incentives Program or other programs in order to improve design, delivery, and cost effectiveness.

4.2.4. Large Commercial/Industrial/Agricultural (CIA) Customer Surveys and Audits Program (existing)

Cost Effectiveness

TRC tests were available for two out of three programs within this program group. Cost effectiveness as suggested by these TRC tests based on measurement and evaluation studies ranges from 1.00 (SCE) to 2.02 (SoCalGas) with a program-budget-weighted average TRC of 1.15. Therefore, the program is moderately cost-effective with strong evidence.

Market Transformation Criteria

The Large CIA Customer Surveys and Audits 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. In 1998, the Large CIA Customer Surveys and Audits Program also provided written

information and workshops to educate customers about standard performance contracting and changes in the electric utility industry in California.

The market transformation plan assumes 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 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 purchase costs. Limited evidence is provided regarding how the program will transform the market for energy efficiency in a self-sustaining way or how the market is changing. A market effects study by Quantum Consulting for SCE[27], indicated largest market effects attributable to audits for HVAC and motors end uses followed by lighting, but the remaining measures (ASD and EMS) had no measurable market effects. The study also described how to evaluate some of the program's underlying assumptions.

The Large CIA Customer Surveys and Audits Program addresses most of the important market barriers to energy efficiency in the CIA retrofit market. SoCalGas suggests that their Industrial Energy Management Services (EMS) program might evolve into an Internet-based self-audit over the next few 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.

Balanced Portfolio Criteria

The Large CIA Customer Surveys and Audits Program contributes to a balanced portfolio by:

- promoting a vibrant energy-efficiency products and services industry that can be self-sustaining without a continuing need for PGC-funded programs by offering audits, surveys, and information about incentive programs to large CIA customers;
- encouraging direct interaction and negotiation between private market participants (including energy-efficiency service providers) and large CIA customers, building lasting relationships that will extend into the future;
- providing large CIA customers with surveys and audits that would not otherwise be provided by the competitive market; and
- transforming markets in an expeditious manner, in view of the limited time horizon over which PGC funding is guaranteed.

The Large CIA Customer Surveys and Audits program is contained within the nonresidential administrator area.

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

Incentive, SPC, Related CPUC Activities Criteria

Not applicable.

Recommendation

The Large CIA Customer Surveys and Audits Program has a strong market transformation plan with limited evidence. The program is moderately cost-effective with strong evidence. Therefore, the program is recommended.

Program Design Recommendations

The Large CIA Customer Surveys and Audits Program should be integrated with other programs (such as the NSPC Program) in order to improve design, delivery, and cost effectiveness.

4.2.5. Energy Efficiency Centers (existing)

Cost Effectiveness

No information is provided regarding cost effectiveness or energy savings.

Market Transformation Criteria

Energy Efficiency Centers offer demonstrations, educational seminars, information, and consulting assistance focused on helping business customers seeking to improve their facilities' efficiencies. 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, properly trained consultants, vendors, distributors, manufacturers, and professional organizations are expected to satisfy the demand.

The Energy Efficiency Center program addresses several key market barriers to energy efficiency including performance uncertainties, information or search costs, asymmetric information or opportunism, and bounded rationality. A CTAC market effects study prepared for CADMAC by Hagler Bailly Consulting, Inc.[28] found reductions in the following market barriers among participants: information costs, performance uncertainty, and information asymmetry. They found only limited reductions in market barriers associated with bounded rationality among participants. Underlying assumptions were also considered in these studies. Conditions for altering or withdrawing the program will depend upon the degree to which Energy Efficiency Center activities are being provided or funded by other market actors.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- promoting a vibrant energy-efficiency services industry that can be self-sustaining without a continuing need for PGC-funded programs by providing workshops, training, and demonstrations to designers, architects, engineers, builders, and contractors;

[28] Hagler Bailly Consulting, Inc. *CTAC Market Effects Study*. San Francisco, CA. 1997.

- encouraging direct interaction and negotiation among private market participants including energy-efficiency service providers, architects, engineers, contractors and customers, building lasting relationships that will extend into the future;
- providing demonstrations, educational seminars, information, and consulting assistance that would not otherwise be provided by the competitive market, thus helping customers capture lost opportunities and avoid cream-skimming;
- empowering customers with both general and customized information on the costs and benefits of energy-efficiency measures in their facilities; and

This cross-cutting program supports many other programs across the nonresidential, residential, and new construction administrator areas. The PG&E Pacific Energy Center, discussed within the Energy Centers program summary under the new construction administrator, provides similar services in a different geographic region. These cross-cutting issues should be considered in selecting the program portfolio.

Incentive, SPC, Related CPUC Activities Criteria

Incentive and SPC criteria not applicable. The program facilitates coordination with local, state, and federal energy-efficiency programs.

Recommendation

The Energy Efficiency Centers Program has a strong market transformation plan with limited evidence. No cost effectiveness information is provided. Therefore, the program is recommended pending cost-effectiveness evaluation.

4.2.6. Building Recommissioning Program (new PY98 and 3rd-party)

Cost Effectiveness

Cost effectiveness information is not available.

Market Transformation Criteria

The Building Recommissioning Program provides 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.

The market transformation plan is aimed at developing building recommissioning and performance analysis as a self-sustaining service. This will be accomplished by training mechanical contractors and engineering firms to provide the service as well as 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. Methods for testing underlying assumptions and measuring market effects are proposed, but no evidence is available to support the theorized market effects. No evidence

provided regarding how the market for recommissioning is changing or likely to change in the absence of PCG-funded intervention.

The program addresses several important market barriers including hassle cost, organizational practices or custom, and product or service unavailability. The success or failure of the program to develop both demand for and supply of building recommissioning services will provide guidance as to whether the program should be altered or withdrawn.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- promoting a vibrant building recommissioning industry that can be self-sustaining without a continuing need for PGC-funded programs;
- encouraging direct interaction and negotiation between recommissioning agents and customers, building lasting relationships that will extend into the future; and
- having the potential to transform market for building recommissioning in an expeditious manner, in view of the limited time horizon over which PGC funding is guaranteed.

The Building Recommissioning Program does not require integration with other program activities within the nonresidential administrator area. However, it could serve as a "feeder" for other programs designed to promote particular technologies or provide financing options, project implementation assistance, or other support for site-specific energy efficiency improvements.

Incentive, SPC, Related CPUC Activities Criteria

Not applicable.

Recommendation

The Building Recommissioning Program provides a weak market transformation plan with no evidence. Cost effectiveness information is not available. Therefore, the program merits consideration with redesign.

4.2.7. Facility Engineer Training Program (new PY98 and out-of-state)

Cost Effectiveness

Estimates of cost effectiveness are not available.

Market Transformation Criteria

The Facility Engineer Training Program (FETP) provides training and certification to building operators and facility managers on energy efficiency operations and maintenance practices. 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 are expected to be more likely to implement their recommendations. The cumulative impact of trained building operators is expected to increase the demand for energy-efficient products and services in the large commercial and industrial market. However, no evidence is provided regarding how the program

will transform the market for energy efficiency in a self-sustaining way or how the market is changing.

The Facility Engineer Training program addresses a number of informational barriers and, more importantly, organizational practices and customs that currently stand in the way of energy efficient building operation and maintenance. No information is provided regarding how important underlying assumptions can be tested. As stated above, the success of the program hinges on obtaining organizational support for Facility Engineer Training from large commercial building owners or management, but SDG&E reports lower-than-expected course participation thus far, suggesting that the marketing element of the program needs enhancement. No conditions for altering or withdrawing the program were provided.

Balanced Portfolio Criteria

The Facility Engineer Training program contributes to a balanced portfolio by providing training activities that would not otherwise be provided by the competitive market. The program can stand on its own, but also has potential to serve a supporting role for other activities within the nonresidential administrator area.

Incentive, SPC, Related CPUC Activities Criteria

Not applicable.

Recommendation

No cost effectiveness information is provided for the Facility Engineer Training Program. The program has a weak market transformation plan with no evidence. Therefore, the program does not meet the assessment criteria.

Program Design Recommendations

Elements of the Facility Engineer Training Program could be included within the Building Recommissioning Program.

4.2.8. Food Service Equipment Center (existing)

Cost Effectiveness

No information is provided regarding cost effectiveness or energy savings.

Market Transformation Criteria

The FSEC provides the commercial food service market with impartial, reliable, and useful information that will stimulate the energy-efficient design, operation, and purchase of commercial food service facilities. The FSEC provides benefits to all major market segments in the food service industry. The FSEC market transformation plan aims to institutionalize energy efficiency testing and practices within the food service industry in order to reduce and eliminate market barriers. The FSEC has been in operation since 1987, and in that time has developed a national reputation for useful information regarding testing, specification, and operation of high-efficiency food service equipment and practices. The FSEC has developed test methods that allow efficiency

comparison between different brands of food service equipment Increased demand for objective test data affirms the sustainability of the market transformation effect. Additional evidence of sustainability is indicated by significant co-funding from third parties (i.e., GRI, EPRI, and the CEC).

The FSEC program addresses several key market barriers to energy efficiency, including: performance uncertainties; information or search costs; hassle or transaction costs; inseparability of product features; service or product unavailability; and asymmetric information or opportunism. 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. Such tests are made according to ASTM[29] test methods developed at PG&E's Food Service Technology Center (generically referred to here as FSEC). Prior to the development and application of ASTM test methods developed by FSEC, it was virtually impossible for food service operators to consider energy efficiency in purchasing decisions. Four new test methods were developed in 1998. Conditions for altering or withdrawing the program will depend upon the degree to which FSEC activities are being provided or funded by other market actors.

Balanced Portfolio Criteria

This program moderately contributes to a balanced portfolio by:

- promoting a vibrant energy-efficiency food service equipment industry that can be self-sustaining without a continuing need for PGC-funded programs;
- transforming the "upstream" market for energy-efficient food service products and practices that are made available, promoted, and advertised by private market participants;
- supporting the development of food service equipment testing standards and activities that are not being provided by the competitive market (e.g., capturing lost opportunities); and
- empowering small commercial customers with meaningful information on the costs and benefits of energy-efficient food service products.

This stand-alone program is contained within the nonresidential administrator area.

Incentive, SPC, Related CPUC Activities Criteria

Not applicable.

Recommendation

The FSEC Program has a strong market transformation plan with limited evidence. No cost effectiveness information is provided. Therefore, the program is recommended pending cost-effectiveness evaluation.

[29] The American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428.

4.2.9. Nonresidential Financing Program (new PY98)

Cost Effectiveness

No information is provided regarding cost effectiveness or energy savings.

Market Transformation Criteria

The Nonresidential Financing Program provides loans to small commercial customers who wish to improve the energy efficiency of their facilities. The program initially planned to transform the market by helping financial institutions launch simple financing options for small commercial customers. However, no private financial institutions were interested so the program is now working exclusively with SAFE-BIDCO (a state-funded non-profit organization) to offer loans in conjunction with energy audits. This is also a difficult market to recruit interested customer participants, as this sector has historically had low participation in energy efficiency programs. No evidence is provided regarding how the program is transforming the market for energy efficiency in a self-sustaining way.

If there were no program, the private sector would not offer this service. No information is provided on how the market is changing or how underlying assumptions can be tested. If the program were to be continued, success would be indicated by number of participating customers that would not have done projects without the loan program. Another indicator would be private institutions beginning to offer similar services. 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.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by targeting an under-served market (small commercial). The Nonresidential Financing Program is not essential to other programs and is contained within the nonresidential administrator area.

Incentive, SPC, Related CPUC Activities Criteria

Not applicable.

Recommendation

The Nonresidential Financing Program has a weak market transformation plan with no evidence. No cost effectiveness information is provided and the program does not appear capable of leveraging large benefits as it had a negative response from financial institutions and PG&E dropped a similar program (Capital Advantage) after a few years of limited participation. Therefore, the program does not meet the assessment criteria.

4.2.10. Nonresidential Standard Performance Contract (NSPC) (new PY98)

Cost Effectiveness

TRC tests based on projected savings were available for all three new programs within this program group. Cost effectiveness as suggested by these TRC tests ranges from 1.86 to 4.01 with

a program-budget-weighted average TRC of 2.88. Therefore, the program is strongly cost-effective with strong evidence.

Market Transformation Criteria

Through the NSPC program energy efficiency service providers (EESPs) or customers enter into a contract with the program administrator through which they receive posted prices for delivering measured energy savings. The NSPC 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 when PCG funding is withdrawn. The ultimate goal is to build a fully competitive, robust, and self-sustaining market for EESPs to deliver energy efficiency products and services. In the absence of the program, customers would implement fewer energy efficiency projects with measured and verified savings. The industry to provide these services would generate less activity than with the program.

The NSPC addresses several all key market barriers including organizational practices or customs, service or product unavailability, information or search costs, access to financing, organization practices, performance uncertainty, tailored applications, local control, and hassle or transaction costs. Information is provided regarding how the market is changing and how underlying assumptions might be evaluated (see Program Summary).

Potential measures of the "success" of the NSPC 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. Two utility sponsored NSPC programs were fully subscribed well before the program deadlines and the third was at 80% as of August 1998. It is too early to determine whether or not the program is transforming markets. CBEE is sponsoring an evaluation of the PY98 NSPC Program, and results should be available in late 1998. 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.

Balanced Portfolio Criteria

This NSPC program contributes to a balanced portfolio in several ways by:

- promoting a vibrant EESP industry that can be self-sustaining without a continuing need for PGC-funded programs;
- encouraging direct interaction and negotiation between EESPs and customers, building lasting relationships that will extend into the future;
- supporting Standard Performance Contracting activities that would not otherwise be provided by the competitive market;
- transforming the nonresidential retrofit market in an expeditious manner, in view of the limited time horizon over which PGC funding is guaranteed; and

- maximizing and leveraging societal and in-state energy-efficiency-related benefits achievable through PGC funding by achieving large verified energy savings.

The NSPC program is contained within the nonresidential administrator area.

Incentive, SPC, Related CPUC Activities Criteria

The program meets the following SPC program requirements specified under Rule IV-7:

- identifies an element of the energy-efficiency service provider industry that will provide the services and the certification requirements of the providers;
- provides posted prices, expressed as a dollar amount per unit of energy-efficiency service provided;
- limits the share of program funds that could be received by an individual customer;
- limits the share of program funds that could be received by an individual energy-efficiency service provider;
- provides fully developed minimum requirements for customer contract language regarding terms and conditions for performance for the service provider (e.g., measurement and verification procedures, equipment maintenance, and financial transactions between the customer and the service provider); and
- identifies a process for addressing and resolving customer complaints associated with the contract between the customer and the service provider, including an identified role for the administrator in the dispute resolution process.

Incentive and CPUC Activities criteria are not applicable.

Recommendation

The NSPC Program has a strong market transformation plan with limited evidence The NSPC program is strongly cost-effective with strong evidence. Therefore, the program is highly recommended.

Design Recommendations

We suggest integrating the NSPC Program with the Large CIA Customer Surveys and Audits Program on a pay-for-performance basis in order to improve design, delivery, and cost effectiveness and privatize these activities. The following changes to program design might also encourage entrance of EESPs and ESCOs into the small to medium-scale commercial markets.[30]

- Measurement and verification requirements could be less rigorous and perhaps tied to IPMVP Option A[31]
- Customers would not be allowed to participate, only EESPs. This is because the objective is to encourage EESPs to enter the market and to minimize administrative costs associated with assisting customers without in-house capabilities to prepare program documentation.
- Customer sites would be allowed to participate if their peak demand is less than 250 kW or their annual electric consumption is below 1.75 million kWh (similar gas rules will apply if gas measures are included). The objective is to not necessarily address the “mom and pop” stores

[30] These suggestions were provided by Steve Schiller of Schiller Associates.

[31] International Performance Measurement and Verification Protocol, 1997. Option A relies heavily on verifying an installed measure’s potential to perform versus determining actual savings.

but medium sized commercial customers such as strip malls or department stores. Additional research is required to assign more exactly program size limits per customer.

- The administrator would be responsible for significant outreach and education activities to bring new and existing EESPs into the small/medium markets and encourage the inclusion of energy efficiency products and services in their current offering to clients.

Given that the programs tended to sell out quickly this year and that there is an existing backlog for program year 1999, the program administrator should consider reducing incentive levels for at least some of the end uses so that more customers can be served.

4.2.11. Small Commercial "Downstream" Incentives Program (existing)

Cost Effectiveness

TRC tests were available for three out of four programs within this program group. Cost effectiveness as suggested by these TRC tests based on measurement and evaluation studies ranges from 1.00 (PG&E), 1.56 (SoCalGas), and 1.91 (SDG&E) with a program-budget-weighted average TRC of 1.22. Therefore, the program is moderately cost-effective with strong evidence.

Market Transformation Criteria

The Small Commercial "Downstream" Incentives Program provides financial incentives to small commercial customers who implement approved energy efficiency modifications. Incentives are offered to 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 small commercial customers can afford to obtain 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. However, this is a difficult market for third parties to successfully provide energy efficiency products and services. Utility "market characterization" and utility-sponsored market effects studies indicate a good understanding of how goods are purchased in the small commercial retrofit market.

The Small Commercial "Downstream" Incentives Program addresses several key market barriers to energy efficiency including information costs/asymmetric information, performance uncertainties, hassle cost, product availability, access to funding, and organizational practices or customs. Increased 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. 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, indicated largest market effects for motors followed by lighting, but the remaining measures (HVAC, ASD and EMS) had no measurable market effects. These studies also provide some description of the program's underlying assumptions.

The program has clearly stated goals and conditions for termination. 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. If this starts to occur, program activities in these market segments should then begin to ramp down. If the market does not begin to provide the products and services directly to the small commercial market 3-5 years, then the program design should be modified.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- promoting a vibrant energy-efficient lighting, air conditioning, and refrigeration products and services industry that can be self-sustaining without a continuing need for PGC-funded programs;
- encouraging direct interaction and negotiation between lighting, air conditioning, and refrigeration vendors and customers, building lasting relationships that will extend into the future;
- empowering customers, especially small commercial customers, with meaningful information on the costs and benefits of energy-efficiency measures;
- potentially transforming markets in an expeditious manner by providing motivation to complete energy-efficient retrofit projects; and
- leveraging societal and in-state energy-efficiency-related benefits achievable through PGC funding by achieving large, documented energy savings.

The Small Commercial "Downstream" Incentives Program is contained within the nonresidential administrator area.

Incentive, SPC, Related CPUC Activities Criteria

No specific information is available about whether or not the program incentives pass the Participant Test although it is generally accepted that the incentives are applied to measures that are cost effective from the participants' perspective with or without the incentive.

Recommendation

The Small Commercial "Downstream" Incentives Program is moderately cost-effective with strong evidence. The program has a strong market transformation plan with strong evidence. Therefore, the program is recommended.

Design Recommendations

This Small Commercial "Downstream" Incentives Program could be integrated with Small Commercial Customer Surveys and Audits in order to improve design, delivery, and cost effectiveness and privatize these activities.

4.2.12. Large Commercial/Industrial/Agricultural (CIA) "Downstream" Incentives Program (existing)

Cost Effectiveness

Cost effectiveness as suggested by TRC tests based on measurement and evaluation studies ranges from 1.10 (PG&E), 1.65 (SoCalGas), to 2.75 (SCE) with a program-budget-weighted average TRC of 1.82. Therefore, the program is strongly cost-effective with strong evidence.

Market Transformation Criteria

The Large CIA "Downstream" Incentives Program provides downstream financial incentives to commercial, industrial, and agricultural customers who implement approved energy efficiency modifications. The market transformation plan aims 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. A market effects study by RLW Analytics, Inc., indicated likely partial persistence of program impacts.

The program addresses several key market barriers to energy efficiency including information costs/asymmetric information, performance uncertainties, hassle costs, access to financing, and organizational practices. 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 have already been evaluated in market effects studies. The PG&E and SDG&E Commercial Lighting Market Effects Study by XENERGY/Easton[32] showed strong evidence for reductions in market barriers associated with high efficiency lighting. The commercial and industrial energy efficiency program market effects study by Quantum Consulting for SCE[33] indicated largest market effects for motors followed by 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.[34], showed strong evidence for market effects with participating customers, and little evidence for market effects with non-participants.

Two conditions for withdrawing the program are provided by SCE: (1) If unit sales of the energy efficient technologies addressed by the program design reach 33 percent of sales for their product

[32] Xenergy, Inc. and Easton Consultants. *PG&E and SDG&E Commercial Lighting Market Effects Study*. Oakland, CA. 1998.

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

[34] RLW Analytics, Inc. *Hydraulic Services Program Market Effects Study*. Sonoma, CA. 1998.

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., _ (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 observed.

Balanced Portfolio Criteria

The Large CIA "Downstream" Incentives Program contributes to a balanced portfolio by:

- promoting a vibrant energy-efficiency products and services industry to support the needs of the large CIA market that can be self-sustaining without a continuing need for PGC-funded programs;
- encouraging direct interaction and negotiation between equipment vendors and customers, building lasting relationships that will extend into the future;
- empowering customers with meaningful information on the costs and benefits of energy-efficiency measures;
- transforming markets in an expeditious manner by providing motivation to complete energy-efficiency improving retrofit projects; and
- maximizing and leveraging societal and in-state energy-efficiency-related benefits achievable through PGC funding by achieving large, documented energy savings.

The Large CIA "Downstream" Incentive Program is contained within the nonresidential administrator area. The program addresses the same market segment and some of the same market barriers as the Nonresidential Standard Performance Contract (NSPC) Program.

Incentive, SPC, Related CPUC Activities Criteria

No specific information is available about the whether the program incentives pass the Participant Test although it is generally accepted that the incentives are applied to projects that are cost effective from the participants perspective with or without the incentive. SPC and Related CPUC Activities criteria are not applicable.

Recommendation

The Large CIA "Downstream" Incentives Program provides a valuable service and is having a positive impact in terms of transforming the market for energy efficiency, particularly for lighting, motors, and hydraulic services technologies. The Large CIA "Downstream" Incentives Program is strongly cost-effective with strong evidence. The program has a strong market transformation plan with strong evidence. Therefore, the program is highly recommended.

Program Design Recommendations

This Large CIA "Downstream" Incentives Program could be integrated with Large CIA Customer Surveys and Audits in order to improve design, delivery, and cost effectiveness and privatize these activities.

4.2.13. Nonresidential "Upstream" Package AC Distributor Incentives (new PY98)

Cost Effectiveness

Cost effectiveness as suggested by the TRC based on projected savings for this program is 1.00. Therefore, the program is moderately cost-effective with moderate evidence.

Market Transformation Criteria

The Nonresidential "Upstream" Package Air Conditioning Incentive Program provides financial incentives in the form of rebates to distributors who sell qualifying package air conditioners. 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. The program is targeted at all nonresidential air conditioning purchasers with emphasis on the small and medium-sized commercial, industrial, and agricultural retrofit market and the small commercial new construction market.

The market transformation plan is based upon the assumption that increased demand spurred by improved information and incentives will eventually result in the production of a greater variety of energy-efficient products sold at lower prices, sustainably transforming the market. Limited evidence is provided regarding how the program will transform the market for energy efficiency in a self-sustaining way and how the market is changing. 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.

The primary market barrier addressed by the program is the limited distribution of high quality but affordable energy efficient air conditioners. The program addresses other key market barriers to energy efficiency including misplaced/split incentives, information/search costs, asymmetric information, performance uncertainties, hassle/transaction costs, product availability, organization practices, and inseparability of product features. Observations of distributor rebate applications can be used to assess support for market transformation in the short-term. 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. 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 a wide selection of high efficiency package air-conditioners. 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.

Balanced Portfolio Criteria

The Nonresidential "Upstream" Package Air Conditioning Incentives Program contributes to a balanced portfolio by:

- promoting a vibrant energy-efficient package air conditioning industry that can be self-sustaining without a continuing need for PGC-funded programs;
- encouraging direct interaction and negotiation between package air conditioning distributors, vendors, and customers, building lasting relationships that will extend into the future;
- transforming package air conditioner distributors so that energy-efficient products and services are made available, promoted, and advertised by private market participants; and
- transforming markets in an expeditious manner, in view of the limited time horizon over which PGC funding is guaranteed by providing motivation to stock and sell energy-efficient package air conditioners.

This incentive program is cross-cutting and spans both the nonresidential and new construction administrator areas.

Incentive, SPC, Related CPUC Activities Criteria

Not applicable.

Recommendation

The Nonresidential "Upstream" Package Air Conditioning Incentive Program is moderately cost-effective with moderate evidence. The program has a strong market transformation plan with limited evidence. Therefore, the program is recommended. However, program redesign may be necessary to improve cost effectiveness.

4.2.14. Nonresidential "Upstream" Motor Incentives (new PY98)

Cost Effectiveness

TRC tests based on projected energy savings 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. Therefore, the program is moderately cost-effective with moderate evidence.

Market Transformation Criteria

The Nonresidential "Upstream" Motor Incentives Program aims to increase vendor and customer demand for premium efficiency motors. The program works with vendors/dealers 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. The market transformation plan assumes that 1) prior to the program, motor distributors stocked motors that just met the EPAct standards and 2) motor vendors do not currently market premium efficiency motors on the basis of energy savings. No information is provided regarding how these assumptions are to be tested, but initial feedback from motor dealers indicates that they are working with manufacturers to allow them to return the EPAct motors and exchange them for the "premium" efficiency motors that qualify for incentives. This limited evidence provides an indication regarding how the market is changing and some indication of program sustainability.

The "upstream" motor initiative program addresses several key market barriers to energy efficiency including information/search costs, asymmetric information, performance uncertainties, hassle/transaction costs, product availability, organizational practices, irreversibility, and inseparability of product features. As of June 1998, SDG&E had 43 motor dealers participating in the program, which was implemented on March 28, 1998. 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). No market or program indicators are available for PG&E or NEEA. Conditions for altering or withdrawing program include altering incentive levels if they aren't high enough to offset the additional cost of premium efficiency motors. The program can be phased out when competitive pressures indicate that distributors are stocking sustainable levels of premium efficiency motors.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- promoting a vibrant industry for energy-efficient motors that can be self-sustaining without a continuing need for PGC-funded programs;
- encouraging direct interaction and negotiation between motor vendors and customers, building lasting relationships that will extend into the future;
- transforming motor manufacturers, dealers, and vendors so that energy-efficient products are made available, promoted, and advertised by private market participants; and
- transforming markets in an expeditious manner, in view of the limited time horizon over which PGC funding is guaranteed by providing motivation to stock and sell energy-efficient motors.

The "Upstream" Motors Incentive program is a stand-alone program that cuts across both the nonresidential and new construction administrator areas.

Incentive, SPC, Related CPUC Activities Criteria

Not applicable.

Recommendation

The Nonresidential "Upstream" Motor Incentives Program is moderately cost-effective with moderate evidence. The program has a moderate market transformation plan with limited evidence. Therefore, this program is recommended.

Design Recommendations

Motor system efficiency improvements have much larger savings potential than installation of high efficiency motors alone. Motors efficiency programs are being discontinued in some parts of the United States (e.g., Wisconsin, Northwest, Northeast) and replaced with industrial process or compressed air energy efficiency programs since much greater energy savings are possible through these types of programs.[35] Therefore, we suggest that the industrial programs (see California Industrial Solutions (4.2.27) include a focus on improving energy-efficient design of industrial motor systems.

[35] Personal communication with Karen Meadows, Energy Center of Wisconsin with Robert Mowris. July 20, 1998.

4.2.15. Nonresidential "Upstream" LED Exit Sign Incentives Program (new PY98)

Cost Effectiveness

Cost effectiveness as suggested by the TRC based on projected savings for this program is 1.00. Therefore, the program is moderately cost-effective with moderate evidence.

Market Transformation Criteria

The program provides participating LED exit sign manufacturers a wholesale cost reduction incentive per qualifying LED exit sign to lower shelf price. The manufacturer passes along 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 (up to 70%). LED exit signs will no longer cost several times as much as incandescent signs. By moving the incentive upstream, additional mark-ups on the factory cost are reduced and product availability can increase dramatically if manufacturers take advantage of the program and choose to sell only LED exit signs. The program targets small commercial customers that are less informed about energy efficiency. Without the significant price discounts from this program, fewer of these customers would purchase the significantly more expensive LED exit signs.

The market transformation plan assumes that educated consumers and vendors will enable the LED exit signs to be sold in greater numbers without artificial price incentives. The 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. Limited evidence is provided regarding how the market is changing.

The "Upstream" LED Exit Sign Incentive Program addresses key market barriers of misplaced/split incentives, product availability, and organizational practices or customs. As of June 1998, SCE reported that eight of 36 manufacturers solicited responded and have received purchase orders from SCE that allow them to bill SCE for price reductions once signs are shipped to distributors. This indicates initial success in carrying out the program plan. Long-term success will be shown by manufacturers switching exclusively to LEDs and additional manufacturers signing up because of competitive pressures. If the program can work with steadily lowered incentive levels, it can eventually be phased out when LED exit signs are the dominant technology and the sales force and customers understand the benefits of the technology. However, this may be difficult, given the large price differential between LED and incandescent exit signs, unless increased market share for LED exit signs contributes to substantially lower costs.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- having the potential to promote a vibrant energy-efficient LED exit sign industry that can be self-sustaining without a continuing need for PGC-funded programs;

- transforming LED exit sign manufacturers so that energy-efficient products are made available, promoted, and advertised by private market participants;
- empowering small commercial customers with meaningful information on the costs and benefits of LED exit signs; and
- having the potential to transform markets over a three to five year timeframe.

The "Upstream" LED Exit Sign Incentive Program is contained within the nonresidential administrator area, but it also crosses over into new construction. These cross-cutting issues should be considered in selecting the program portfolio.

Incentive, SPC, Related CPUC Activities Criteria

Not applicable.

Recommendation

The "Upstream LED Exit Sign Incentive Program is moderately cost-effective with moderate evidence. The program has a strong market transformation plan with limited evidence. Therefore, the program is recommended. However, its cost-effectiveness is marginal and may benefit from redesign to improve cost-effectiveness.

4.2.16. Implementation Assistance Program (existing)

Cost Effectiveness

Of the two programs in this category, only one includes TRC information. The TRC (based on measurement and evaluation studies) for the SoCalGas Energy Edge program is 3.1. Therefore, the program is strongly cost-effective with strong evidence.

Market Transformation Criteria

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. The IAP serves customers that either value services more than financial incentives or do not have the resources or expertise to complete projects themselves. Initial participants in the program have been primarily schools and various levels of government where resources are limited and rebate checks would go back to a general pot of money rather than the department implementing the project. In the absence of the program, large public institutions have a hard time implementing projects and the private sector often shies away from projects with notoriously bureaucratic types of customers (such as cities). No information is provided regarding how the market is changing or how underlying assumptions could be tested or evaluated.

The IAP addresses key market barriers, including access to financing, hassle/transaction costs, organizational practice or custom, information/search costs, asymmetric information, and service or product unavailability. It is too early to tell if the program is transforming the market for energy-efficiency in a self-sustaining way but since customers repay the utility for implementation assistance this program could sustain itself entirely if administrative costs were also charged back

to the customer. As of June 1998, SoCalGas' 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.
. Since implementation is largely through third parties, these parties can start building relationships directly with the customer. Increased participation in the programs and direct contracts between the introduced third parties and the customer would indicate program success. The only instance where direct involvement of utilities is required is the Federal Projects since legislation permits special contracts with the local utility and ESCOs. Unless the legislation changes, these contracts are not transferable.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- promoting a vibrant energy-efficient products and services industry to support public-sector (and other) organizations that can be self-sustaining without a continuing need for PGC-funded programs;
- encouraging direct interaction and negotiation between private market participants (including energy-efficiency service providers, consultants and contractors) and customers, building lasting relationships that will extend into the future; and
- having the potential to transform the public-sector (and perhaps other) markets over a three to five year timeframe by shepherding many energy-efficient retrofit projects to completion.

This program is contained within the nonresidential administrator area, though it could be expanded to new construction. These cross-cutting issues should be considered in selecting the program portfolio.

Incentive, SPC, Related CPUC Activities Criteria

Incentive and SPC criteria are not applicable. The Implementation Assistance Program supports related CPUC activities by facilitating implementation of the Federal Energy Policy Act of 1992.

Recommendation

The Implementation Assistance Program is strongly cost-effective with strong evidence. The program has a moderate market transformation plan with limited evidence. Therefore, the program is recommended.

4.2.17. LED Traffic Signals Standards Program (new PY98)

Cost Effectiveness

No information is provided regarding cost effectiveness or energy savings. The program may be, however, capable of achieving large savings effectively within the traffic light end use. 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. Strong evidence is indicated for at least red LEDs regarding cost effectiveness based on overall energy use in the market segment and potential energy savings.

Market Transformation Criteria

The LED Traffic Signals Standards Program documentation states that implementation of red LEDs has been slowed due to concerns over measure life and that adoption of green and yellow LED technology is being hindered by lack of a standard which current technologies can meet. Part of the program effort will be to assess conclusively whether the current technology for yellow and green LEDs is adequate in terms of safety and visible acuity. No distinct information is provided regarding how to test underlying assumptions because the program itself is testing the assumption that LED traffic signals are a reliable, energy-efficient technology.

The program has a clearly defined plan for transforming the market, consisting of 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. Without the program, implementation of red LEDs would be slowed and initial adoption of yellow and green LEDs would be delayed. Key market barriers addressed by the program are performance uncertainties and product unavailability. The strongest evidence for market transformation will be the adoption of standards by such organizations as CalTrans and the Institute of Traffic Engineers that allow for green and yellow LEDs. Market transformation would also be demonstrated by cities and other users installing red LED traffic signal in larger numbers and starting installation of yellow and green LED traffic signals. Early results from this program (new in 1998) indicate prices for the red LEDs have already experienced a dramatic reduction. New manufacturers for the green LEDs have entered the market, which should help to drive down costs. Several municipalities are reported to already be testing or using yellow and green LEDs, even in the absence of an ITE specification.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- promoting a vibrant energy-efficient traffic signals industry that can be self-sustaining without a continuing need for PGC-funded programs;
- encouraging direct interaction and negotiation between LED traffic signal manufacturers, vendors and customers;
- transforming LED traffic signal manufacturers so that energy-efficient products are made available, promoted, and advertised;
- capturing lost opportunities by addressing new traffic signal installation as well as retrofit;
- having the potential to transform markets over a three to five year timeframe by working with key standard-setting organizations;
- stimulating potentially cost-effective emerging technologies (yellow and green LED traffic signals); and

- providing leveraged benefits by transforming the market for LED traffic signals using PGC funds.

This stand-alone program is contained within the nonresidential administrator area.

Incentive, SPC, Related CPUC Activities Criteria

Not applicable.

Recommendation

The LED Traffic Signals Standards Program has the potential to achieve market transformation within a short timeframe. Program sponsors indicate a three- to four-year time horizon for the program to transform the market. Given that adoption of LED traffic light technology has already started, this seems reasonable once the remaining market barriers are addressed. Another reason for rapid impact is that the number of customers is limited and that customers will see maintenance benefits in addition to the energy savings. No cost-effectiveness information is provided, however strong evidence is provided to support cost effectiveness. Therefore, the program is recommended.

4.2.18. Hotel and Motel Efficient Technologies Demonstration (new PY98)

Cost Effectiveness

No information is provided regarding cost effectiveness or energy savings. However, the targeted end use technologies are CFLs, LED exit signs, and motion sensors which have strong cost effectiveness in other programs (see Nonresidential "Upstream" LED Exit Sign Incentives Program, 4.2.15). Strong evidence is provided regarding energy use in the market sector (lighting end use), and the potential energy savings for the targeted technologies (CFLs, LED exit signs, and motion sensors) which are cost effective in other programs.

Market Transformation Criteria

The Hotel and Motel Efficient Technologies Program works with management of major hotel and motel chains to demonstrate and improve energy efficiency of terminal unit air conditioners, ice and vending machines, lighting, and laundry facilities. The program provides financing where necessary.

The market transformation plan is to cause a significant increase in the penetration of the target technologies as a result of direct educational work with top management and strategic demonstrations in six large hotel chains. By targeting a limited number of large chains, the odds of successful implementation are improved. Market transformation would occur when other large chains and then small chains adopt the same technologies and approaches. Limited evidence is provided regarding how the market is changing and how the program will transform the market for energy efficiency in a self-sustaining way.

The Hotel and Motel Efficient Technologies Program addresses the following key market barriers: organizational practices or customs, information or search costs, performance uncertainties, bounded rationality, access to or understanding of financing, and asymmetric information or

opportunism. According to PG&E, 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. The large hotel sector has historically adopted some energy efficiency measures. In the absence of the program, newer technologies would be adopted more slowly and hotels would instead tend to rely only on well-proven technologies.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- promoting a vibrant energy-efficient hotel and motel industry that can be self-sustaining without a continuing need for PGC-funded programs;
- encouraging direct interaction and negotiation between hotel and motel chains and suppliers of energy-efficient lighting equipment;
- capturing lost opportunities to improve hotel and motel lighting;
- having the potential to transform the market for energy-efficient hotel and motel lighting over a three to five year timeframe; and
- stimulating cost-effective lighting technologies such as CFLs, LED exit signs, and motion sensors.

This program is contained within the nonresidential administrator area.

Incentive, SPC, Related CPUC Activities Criteria

Not applicable.

Recommendation

The Hotel and Motel Efficient Technologies Demonstration Program has a strong market transformation plan with limited evidence. No cost effectiveness information is provided, however strong evidence is provided to support cost effectiveness. Therefore, the program is recommended.

4.2.19. Lighting Controls Demonstration Program (new PY98)

Cost Effectiveness

Estimates of cost effectiveness and energy savings are not available.

Market Transformation Criteria

The Lighting Controls Program will work to integrate lighting controls into lighting standards, design tools, and specifying practices. Market transformation will be accomplished through five main strategies: providing information, working with manufacturers to establish product testing protocols, integrating controls into simulation tools, fostering changes in building code standards, and educating design professionals. In the absence of the program, manufacturers would develop and market control technologies on their own. This program can speed development and adoption. No evidence is provided regarding how the program will transform the market for energy efficiency in a self-sustaining way or how the market is changing.

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. As the program is in the early stages, no other program feedback is available yet. Getting manufacturers to produce new products, designers to specify them, and customers to request these technologies would all be indicators of program success. If the program cannot do these things or make progress toward those goals, then the program should be withdrawn.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- transforming lighting controls manufacturers and lighting design professionals so that energy-efficient products and services are made available, promoted, and advertised by private market participants;
- supporting activities that would not otherwise be provided by the competitive market by capturing lost opportunities in lighting efficiency;
- stimulating potentially cost-effective lighting control technologies; and
- providing leveraged benefits by transforming the market for lighting controls using PGC funds.

The Lighting Controls Demonstration Program is a stand-alone cross-cutting program overlapping the nonresidential and new construction administrator areas.

Incentive, SPC, Related CPUC Activities Criteria

Not applicable.

Recommendation

The Lighting Controls Program has a weak market transformation plan with limited evidence. No cost effectiveness information is provided. Therefore, the program merits consideration with redesign.

4.2.20. Daylighting Productivity Study (3rd-party and out-of-state)

Cost Effectiveness

No information is provided regarding cost effectiveness or energy savings.

Market Transformation Criteria

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. 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 building operator community. The plan includes market research tasks to assess current attitudes towards daylighting and to determine how to best present daylighting information to the relevant parties. Once this is done, the program

has served its primary purpose and is no longer necessary. No evidence is provided regarding how the program will transform the market for energy efficiency in a self-sustaining way or how the market is changing.

Through the dissemination of information the program addresses multiple market barriers such as organizational practices, performance uncertainties, information costs, and asymmetric information. No information is provided regarding how underlying assumptions might be tested since the study itself is an evaluation of the idea that daylighting and productivity are linked and this linkage can be used to promote energy efficiency. The daylighting market assessment will provide a basis upon which to judge the program's effectiveness. Future, post-implementation market studies can be used as indicators of program success. If the studies' 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.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- encouraging direct interaction and negotiation between lighting designers and builders to build lasting relationships that will extend into the future;
- targeting "upstream" lighting designers and builders so that energy-efficient products and services are made available, promoted, and advertised by private market participants;
- conducting a study that would not otherwise be provided by the competitive market in order to capture lost opportunities in daylighting;
- empowering customers with meaningful information on the costs and benefits of daylighting; and
- maximizing societal and in-state energy-efficiency-related through PGC funding by investigating advanced daylighting systems.

The Daylighting Productivity Study is a stand-alone program contained within the Nonresidential and new construction administrator areas.

Incentive, SPC, Related CPUC Activities Criteria

Not applicable.

Recommendation

The Daylighting Productivity Study has a moderate market transformation plan with no evidence. No cost effectiveness information is provided. Therefore, the program is recommended pending further study.

4.2.21. Microelectronics Industry Efficiency Initiative (out-of-state)

Cost Effectiveness

Estimates of projected savings from this out-of-state program are not available.

Market Transformation Criteria

The market transformation plan is to change the standard practice for construction and operation of microelectronics manufacturing plants to an integrated design approach. 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. An important feature is that the program is marketed largely through promotion of non-energy business benefits such as reduced plant costs, reduced construction time, and other important motivators for market participants. This strategy improves the chances of successful market transformation and a sustainable program concept. The market transformation plan indicates a good understanding of the large and rapidly expanding microelectronics manufacturing industry. However, no evidence was available regarding how the program will transform the market for energy efficiency in a self-sustaining way or how the market is changing.

The program addresses the market transformation barriers of information and search and hassle costs by bringing energy efficiency professionals and market participants together. Early technology adopters are encouraged through the program, and their risks are minimized through collaboration with efficiency specialists. Transaction costs for early adopters are minimized through the use of project sponsoring of efficiency consultation. Program performance can be judged through participation and adoption rates. Conditions for altering or withdrawing the program will depend upon successful demonstrations of Design for Energy Efficiency (DFEE) concept in the microelectronics industry and marketing DFEE to the general microelectronics industry.

The program assumes that fab designers are not currently aware of more energy efficient plant construction techniques but will be motivated to change their design practice based on the energy and non-energy benefits proposed in the DFEE process. So far these assumptions have not been formally tested in practice or in a market assessment. Data on program performance indicators are currently not available.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- promoting a vibrant Design for Energy Efficiency (DFEE) industry that supports the microelectronics industry and can be self-sustaining without a continuing need for PGC-funded programs;
- encouraging direct interaction and negotiation between DFEE industrial design professionals and customers, building lasting relationships that will extend into the future;
- transforming the “upstream” market for DFEE that are made available, promoted, and implemented by private market participants;
- supporting the development of a DFEE integrated design infrastructure that is currently not being provided by the competitive market (e.g., capturing lost opportunities and avoiding cream-skimming); and
- transforming the market for DFEE in an expeditious manner by working with “early adopters” who will quickly set the pace for the rest of the industry.

The MIEI program is a stand-alone program contained within the nonresidential administrator area.

Incentive, SPC, Related CPUC Activities Criteria

Not applicable.

Recommendation

The MIEI has a moderate market transformation plan with no evidence. No cost effectiveness information is provided. The methods used in this program can be readily applied to California's high-technology industry. Therefore, the program is recommended pending further study.

4.2.22. Silicon Crystal Growing Facilities Program (out-of-state)

Cost Effectiveness

Estimates of projected savings from this out-of-state program are not available.

Market Transformation Criteria

The Silicon Crystal Growing Facilities Program market transformation plan indicates a good understanding of the silicon crystal growing industry in the Pacific Northwest. The market transformation objective is to first develop and implement furnace efficiency improvements at Siemens' facility in Vancouver, WA and then transfer the technologies to the much larger semiconductor industry. The silicon crystal and wafer production industry is forecasted to substantially expand in the Pacific Northwest, indicating a large market for efficient furnace technologies. No information on the current or projected size of the industry in California was available. The technology developed under the program is projected to have significant non-energy benefits that will help assure the sustainability of the market transformation. However, no evidence is provided regarding how the program will transform the market for energy efficiency in a self-sustaining way or how the market is changing.

The program addresses a majority of the key market barriers to energy efficiency including performance uncertainties, information or search costs, hassle or transaction costs, inseparability of product features, service or product unavailability, organizational practices or custom, and asymmetric information or opportunism. Evaluation of program success will depend upon successful demonstration of the high efficiency crystal-growing furnace and the degree to which the technology becomes the industry standard. There is insufficient information to evaluate if the market transformation plan can be successfully applied to California.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- promoting a vibrant energy-efficient crystal-growing furnace industry that can be self-sustaining without a continuing need for PGC-funded programs;
- encouraging direct interaction between private market participants (manufacturers and designers of energy efficient furnace technologies) and customers;

- transforming the "upstream" market (manufacturers) of energy-efficient crystal-growing furnace technologies so that they are made available, promoted, and advertised by private market participants;
- transforming markets in an expeditious manner, in view of the limited time horizon over which PGC funding is guaranteed by working with a leading company that will quickly set the pace for the rest of the industry; and
- providing leveraged benefits achievable through transforming the market for the silicon crystal-growing furnaces used in the photovoltaic and semiconductor industries.

The Silicon Crystal Growing Facilities Program is a stand-alone program contained within the nonresidential administrator area.

Incentive, SPC, Related CPUC Activities Criteria

Not applicable.

Recommendation

The Silicon Crystal Growing Facilities Program is projected to have a positive impact on an energy intensive and growing market segment. The program has a moderate market transformation plan with no evidence. No cost effectiveness information is provided. Therefore, this program is recommended pending further study of its applicability to California's high-technology semiconductor industry.

4.2.23. Vendor Linkages to Customers Program (new PY98)

Cost Effectiveness

No information is provided regarding cost effectiveness. However, strong evidence is indicated regarding cost effectiveness based on the following information: use of low-cost Websites to link customers with vendors; vendors paying to be listed on the site; program serves all commercial and residential market segments; and the fact that most of the technologies listed on the website are cost effective by themselves (i.e., Energy Star lighting fixtures and appliances).

Market Transformation Criteria

The Vendor Linkages to Customers Program is meant to help connect customers with suppliers of energy-efficient products and services without providing specific recommendations for one supplier over another. Certain products that are particularly hard to find are given added prominence and fees collected from listed vendors are used to promote the program and energy efficiency in general. The program provides these services through a searchable database accessed via the Internet or in a printed directory.

The market transformation plan is aimed at providing a better method for customers to find vendors that supply energy efficient equipment. An Internet site and advertising are partially supported by subscriptions from vendors. As more vendors sign up, the program has the potential to become self-sustaining. No evidence is provided regarding how the market is changing.

The program addresses several market barriers by providing consumers the means to find and contact energy efficient equipment suppliers. Market barriers addressed include information costs, hassle or transaction costs, asymmetric information, and service or product unavailability. The program has only been active for a short time so it is too early to discern any market effects, but the program manager reports that 40 vendors have paid to be listed on the web site as of early August, 1998. The fact that vendors have been willing pay to participate in the program is an indicator of potential self-sustainability. Market transformation will be indicated through increased adoption of energy-efficient products in the state. Web site traffic will indicate program participation. PGC funding could be reduced as the program becomes self-sustaining.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- Promoting a vibrant energy-efficiency products and services industry using an Internet-based vendor referral service that can be self-sustaining without a continuing need for PGC-funded programs;
- encouraging direct interaction and negotiation between vendors of energy efficient equipment and customers, building lasting relationships that will extend into the future;
- supporting Internet-based vendor referrals that would not otherwise be provided by the competitive market (but might be so in the future as the concept is demonstrated to work); and
- empowering customers, especially residential and small commercial customers, with meaningful information using an energy-efficiency Internet–based vendor referral service.

This Vendor Linkages to Customers Program spans all administrator areas and provides support to many other programs. The program overlaps the residential and nonresidential administrator areas.

Incentive, SPC, Related CPUC Activities Criteria

Not applicable.

Recommendation

The Vendor Linkages to Customers Program has the potential to provide a valuable service to consumers in California. This new program has a strong market transformation plan with limited evidence. No cost effectiveness information is provided, however strong evidence is provided to support cost effectiveness. Therefore, this program is recommended.

4.2.24. Energy Efficiency and Property Valuation Study (3rd-party)

Cost Effectiveness

No information is provided regarding cost effectiveness or energy savings.

Market Transformation Criteria

The Energy Efficiency and Property Valuation study was a new initiative in 1998. The study conducted a market survey assessment of current attitudes and practices regarding valuation of energy efficiency in commercial buildings and provide model policies aimed at the municipal or

state level to protect buildings with incremental appraised energy-efficiency value from additional property tax assessment. No information on program activities completed to date or as to how the commercial property market is changing or would/would not change in the absence of the program were provided. 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. It is too early to assess whether the program is transforming markets in a self-sustaining way, but the market transformation plan has a solid theoretical basis for a self-sustaining outcome.

The Energy Efficiency and Property Valuation Study addresses key market barriers of organizational practices or customs and split incentives. Indicators of success at reducing these market barriers will include private sector adoption of program-recommended property valuation methodologies and regulatory or policy guidelines. The program could be withdrawn when and if these methods and policy guidelines are adopted by appraisers and major municipalities. No information is provided regarding how important underlying assumptions can be tested or evaluated.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- providing a supporting infrastructure for a vibrant energy-efficiency products and services industry by incorporating energy efficiency considerations into property valuation in a self-sustaining way without a continuing need for PGC-funded programs;
- targeting appraisers and builders so that energy-efficient buildings are made available, promoted, and advertised by private market participants;
- empowering customers with meaningful information on the costs and benefits of energy-efficiency measures as expressed through the value of their properties;
- transforming markets in an expeditious manner by working with organizations that can institute sweeping changes in property valuation across the state; and
- leveraging societal benefits achievable through PGC funding by working to insure that PGC-funded energy efficiency improvements to commercial buildings are reflected in their appraisal value.

The Energy Efficiency and Property Valuation Study is not essential to the operation of other programs but could, if successful, create fundamental and lasting changes in the commercial market that might increase its ability to support a self-sustaining energy-efficiency products and services industry. The program will need to be coordinated with the new construction administrator as property appraisals are done for both new and existing buildings.

Incentive, SPC, Related CPUC Activities Criteria

Not applicable.

Recommendation

The Energy Efficiency and Property Valuation Study aims to create a fundamental change in the commercial market that will have far-reaching benefits in terms of supporting other PCG-funded

and privately sponsored energy-efficiency activities in the future. The study has a moderate market transformation plan with no evidence. No cost effectiveness information is provided. Therefore, the program concept is recommended pending further study.

4.2.25. Local Government and Community Energy Efficiency Program (3rd-party and out-of-state)

Cost Effectiveness

None of the programs in this category provide indicators cost effectiveness or energy savings. However, Dan Lieberman of the City of San Jose provided example calculations indicating a strong benefit-cost ratio of 2.08. Only limited evidence was provided to support the example cost-benefit ratio.

Market Transformation Criteria

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.

The Local Government and Community Energy Efficiency program addresses key market barriers of 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. Indicators of program success include recruiting additional local governments, implemented energy saving projects, and institutionalization of energy efficiency concerns in local planning processes or codes. PGC funding could be phased out as cities see the value in energy planning and fund it themselves.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- encouraging direct interaction and negotiation between local government, private market participants, and customers, building lasting relationships that will extend into the future;
- empowering customers, especially residential and small commercial customers, with meaningful information on the costs and benefits of energy-efficiency measures; and
- maximizing (or leveraging) societal and in-state energy-efficiency-related benefits achievable through PGC funding by ensuring coordination with local and municipal energy efficiency efforts, including those imbedded in broader community planning. For example, strategies such as reducing heat islands by narrowing streets, street tree planting, and planting trees in parking lots, happen at the community level and cannot be instigated and implemented effectively by the private sector.

This program supports many other programs. The program is cross-cutting and overlaps all three administrator areas (nonresidential, residential, and new construction).

Incentive, SPC, Related CPUC Activities Criteria

The program supports local energy-efficiency market transformation efforts and energy efficiency laws and codes.

Recommendation

The Local Government and Community Energy Efficiency Program supports local energy-efficiency efforts and laws. The program has a strong market transformation plan with limited evidence. Comments provided by Dan Lieberman (City of San Jose) and the California Communities Energy Alliance (CCEA) indicate a cost-benefit ratio of 2.08 with limited evidence to support the calculation. Therefore, this program is recommended.

4.2.26. Integrated Small Commercial Energy Efficiency Program[36] (new concept)

Cost Effectiveness

The benefit-to-cost ratio for this new program concept is estimated to be equal to 1.5. Strong evidence is provided to support cost effectiveness based on estimates of energy use in the small commercial market segment, market penetration, demand response and potential energy savings.

Market Transformation Criteria

The Integrated Small Commercial Energy Efficiency Program contains many services that might be offered as distinct programs, including financing, “downstream” equipment incentives, training, and technical assistance. However, experience has shown that the market does not integrate services for these customers because they are too small to merit a “customized” solution. The distinguishing feature of this program concept is that services are offered as a package to the small commercial customer. Such a stand-alone package of services is more likely to address the range of barriers that prevent many energy efficiency projects from getting beyond the audit stage.

The market transformation plan indicates a good understanding of the small commercial market and provides a logical and coherent theory to support the chain of events leading to self-

[36] Program concept submitted by the California Energy Commission.

sufficiency. No evidence is provided regarding how the program will transform the market for energy efficiency in a self-sustaining way or how the small commercial market for energy efficiency is changing. However, it is argued that small commercial customers would do little or no energy efficiency installation if there were no PGC-funded program.

The Integrated Small Commercial Energy Efficiency program addresses several key market barriers to energy efficiency including information or search costs, access to financing, and (most important) hassle or transaction costs. The program concept provides detailed methods for testing underlying assumptions. Some of the assumptions (such as the need for a low- cost method of providing technical assistance, energy audits and follow-up assistance) used in this program have already been tested through the Energy Commission's Energy Partnership and Bright Schools Programs. Intermediate and ultimate indicators that might be used to determine when it might be appropriate to modify or terminate the program are less clearly defined.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- promoting a vibrant energy-efficiency products and services industry to support the small commercial market that can be self-sustaining without a continuing need for PGC-funded programs;
- encouraging direct interaction and negotiation between energy-efficiency service providers, contractors, consultants, and small commercial customers; and
- empowering small commercial customers with meaningful, tailored information on the costs and benefits of energy-efficiency measures.

Incentive, SPC, Related CPUC Activities Criteria

Since incentives and cost-sharing of technical assistance are two elements of the Small Commercial Energy Efficiency Program service package, the Participant Test should be applied to this new program concept. SPC and CPUC Activities criteria are not applicable.

Recommendation

The Integrated Small Commercial Energy Efficiency Program is proposed to provide a valuable package of services to a market segment traditionally difficult to reach and therefore often under-served. The program has a strong market transformation plan with limited evidence. Cost-effectiveness of this new program concept is strong, with strong evidence. Therefore, this program concept is recommended.

4.2.27. California Industrial Solutions[37] (new concept)

Cost Effectiveness

TRC results were not provided for this new program concept. Proposed program costs and savings were used to estimate the cost of conserved energy at $0.03/kWh (excluding client co-payment). Strong evidence is provided to support cost effectiveness based on estimates of energy

[37] Program concept submitted by the California Energy Commission.

use in the industrial market segment, market penetration, demand response and potential energy savings.

Market Transformation Criteria

The California Industrial Solutions Program provides subsidized technical assistance to industrial customers and looks at integrated system energy consumption and factors in productivity, pollution prevention, worker safety, and environmental compliance issues. The program will also fund demonstration projects. Marketing and delivery will be implemented through organizations that already work with industrial customers.

Industrial customers are constantly faced with the need to improve productivity and achieve environmental compliance. This program taps into those needs and plans to transform the market by working within existing delivery mechanisms for the sector to deliver combined energy, productivity, and environmental compliance benefits. This is in contrast to historical energy efficiency programs for this sector which have often been treated as modified commercial programs that focused on energy efficiency. Demonstration programs and marketing through trade organizations and industrial publications will be used to generate additional interest among industrial customers. The program will begin with customer co-payments and gradually transition to full customer funding of services. Without the program, energy efficiency is less likely to be incorporated into productivity and environmental compliance projects.

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 of these would indicate a change in awareness and organizational practices of the industrial sector.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- promoting a vibrant energy-efficiency products and services industry to support industrial customers that can be self-sustaining without a continuing need for PGC-funded programs
- encouraging direct interaction and negotiation between energy-efficiency service providers, and others already servicing industrial customers;
- avoiding cream skimming by focusing on integrated solutions to industrial productivity, safety, environmental compliance, and energy problems;
- empowering customers with meaningful, customized information on the costs and benefits of energy-efficiency measures for industrial facilities; and
- providing leveraged benefits by transforming the market for integrated solutions to industrial energy efficiency with PGC funds.

The California Industrial Solutions Program is an Industrial Incentives program within the nonresidential administrator area.

Incentive, SPC, Related CPUC Activities Criteria

Insufficient information is available to evaluate the incentive portion of this program. SPC and Related CPUC Activities criteria are not applicable.

Recommendation

The California Industrial Solutions Program has a strong market transformation plan with limited evidence. The benefit-to-cost ratio for this program is not provided, but there is strong evidence for cost effectiveness. Therefore, this new program concept is recommended pending a more formal cost effectiveness evaluation.

4.2.28. Integrated Irrigation System Operation[38] (new concept)

Cost Effectiveness

TRC results were not provided for this new program concept. Proposed program costs and savings were used to estimate a simple rate of return on investment of 16.29%. Strong evidence is provided to support cost effectiveness based on estimates of energy use for agricultural irrigation, market penetration, demand response and potential energy savings.

Market Transformation Criteria

The proposed Integrated Irrigation System Operation Program would offer incentives for farmers to achieve energy efficiency in their water management practices. The program would deliver technical support and cash incentives to motivate farmers to learn and invest in new irrigation systems. The program would also deliver hands-on training to farmers and farm workers. The market transformation plan indicates a good understanding of the agricultural sector and a clear plan for program execution. The program is intended to transform the agricultural energy sector in a self-sustaining way by increasing the adoption of scientific irrigation practices coupled with system changes to improve delivery efficiency. Farmers have been slow to adopt scientific irrigation practices in the absence of such a program. The primary method for increasing adoption of the technology is through technical outreach services such as free on-site evaluations and training. Incentives will also be used on targeted groups to increase market acceptance until such a time as the practices gain wider acceptance and incentives are unnecessary.

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.

The program addresses key market barriers such as organizational practices, performance uncertainties, information and search costs, hassle and transaction costs, and asymmetric information. 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 success will be evaluated based

[38] Program concept submitted by the California Energy Commission.

upon the number of farmers using pump and irrigation system evaluation services, the number of farmers acquiring emerging irrigation technologies and data collection tools. The program plan includes the use of a control field to compare program results with existing practices.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- Promoting a vibrant energy-efficiency products and services industry to support the irrigated agriculture market that can be self-sustaining without a continuing need for PGC-funded programs;
- encouraging direct interaction and negotiation between scientific irrigation service providers and customers, building lasting relationships that will extend into the future;
- supporting scientific irrigation services that would not otherwise be provided by the competitive market and capturing lost opportunities;
- empowering customers, with meaningful information on the costs and benefits of energy-efficient irrigation practices; and
- maximizing societal and in-state energy-efficiency-related benefits achievable through PGC funding by targeting agricultural irrigation customers with few other opportunities to participate in PCG-funded programs.

The Integrated Irrigation System Operation falls solely within the nonresidential administrator area.

Incentive, SPC, Related CPUC Activities Criteria

Insufficient information is available to evaluate the incentive portion of this program. SPC and Related CPUC Activities criteria are not applicable.

Recommendation

The Integrated Irrigation System Operation has a strong market transformation plan with limited evidence. The benefit-to-cost ratio for this program is not provided, but there is strong evidence for cost effectiveness. Therefore, this program concept is recommended.

5. Residential Program Administrator Area

This chapter contains the following sections:

- Residential Program Recommendations, Services Provided to Market Actors, Program Summary Tables, and Balanced Portfolio Contribution; and
- Residential Program Assessments

5.1. Residential Program Recommendations, Services Provided to Market Actors, Program Summary Tables, and Balanced Portfolio Contribution

This section provides a summary of recommendations for each of the 17 Residential Programs. The rules in Section 3.3.5 are used to make program recommendations. Recommendations are listed below and summarized in Table 5.1.1. This section also includes a summary of program services provided to market actors in Table 5.1.2, program summary tables of end uses, technologies, services, practices, market events, customer/building type, and PY98 budget in Table 5.1.3, and a summary of each program's contribution to a balanced portfolio in Table 5.1.4.

5.1.1. Highly Recommended Programs

No programs are highly recommended.

5.1.2. Recommended Programs

The following programs are recommended.

- Centralized Procurement of Energy Efficient Appliances;
- Air Conditioning Contractor Training Program;
- Alliances/Branding/Labeling Program;
- Residential Standard Performance Contract (RSPC) Program;
- "Downstream" Appliance Incentive Program;
- Residential "Upstream" Incentives Program;
- Spare Refrigerator Recycling Program; and
- Energy Efficiency Mortgages and Loans Program
- Appliance Early Retirement Program (New Concept).

5.1.3. Programs Recommended Pending Cost-Effectiveness Evaluation

The following programs are recommended pending cost-effectiveness evaluation.

- Residential Energy Efficiency Training Center;
- California Home Energy Efficiency Rating System (CHEERS) Support Program; and

5.1.4. Programs Recommended Pending Further Study

The following program is recommended pending further study.

- Public Sector Housing Design Guidelines and Procurement Assistance.

5.1.5. Programs That Merit Consideration With Redesign

The following programs merit consideration with redesign to improve cost-effectiveness (which may involve integration with other programs).

- Residential Information and Education Program;
- Audits and Surveys Program; and
- Integrated Residential Retrofit.

5.1.6. Programs (or Program Concepts) That Do Not Meet Assessment Criteria

The following programs (or program concepts) could not be recommended based on the criteria, methodology, and rules defined in Sections 3.1, 3.2, and 3.3.

- "Upstream" Windows Training Program; and
- Contractor Marketing Program.

5.1.7. Services Provided to Market Actors and Program Summary Tables

A summary of residential program services provided to market actors is shown in Table 5.1.2. This summary table shows both the services provided to market actors as well an indication of which actors provide these services.[39] A summary of residential program end uses, technologies, services, practices, market events, customer/building type, and PY98 budget is shown in Table 5.1.3.

5.1.8. Summary of Contribution to Balanced Portfolio

Each program's contribution to a balanced portfolio and cross-cutting programs that overlap more than one Administrator are shown in Table 5.1.4. The potential for contributing to a balanced portfolio can only be assessed when the program portfolio is selected. A pass/fail assessment is made of each program's potential contribution to a balanced portfolio, but no attempt is made to judge the quality of that contribution relative to each of the other programs.

The following cross-cutting programs overlap more than one Administrator area:

- Public Sector Housing Design Guidelines and Procurement Assistance (residential and new construction);
- California Home Energy Efficiency Rating System (CHEERS) Support Program (residential and new construction);
- Alliances/Branding/Labeling Program (nonresidential, residential, and new construction);
- "Downstream" Appliance Incentive Program (residential and new construction);
- Integrated Residential Retrofit (New Concept) (residential and new construction); and
- Residential Energy Efficiency Training Center (nonresidential, residential, and new construction).

[39] Market actors providing services are not identified for programs where the services are provided by interim administrator staff .

Table 5.1.1. Summary of Residential Program Assessment and Recommendations

Program Name	Existing, New 3rd-Party, Out-of-State	Cost Effectiveness	Market Transformation	Other Criteria	Recommendation
1) Residential Information and Education Program	Existing & 3rd-party	No Information, No Evidence	Weak Plan, Limited Evidence	Coordinates with CPUC educational outreach activities	Merits consideration with redesign to integrate into other programs
2) Public Sector Housing Design Guidelines and Procurement Assistance	Out-of-state	No Information, No Evidence	Moderate Plan, No Evidence	Supports low-income programs	Recommended pending further study
3) Centralized Procurement of Energy Efficient Appliances	New PY98 & 3rd-party	No Information, Strong Evidence	Moderate Plan, Limited Evidence	Supports low-income programs	Recommended
4) Audits and Surveys Program	Existing & 3rd-party	Weak TRC, Strong Evidence	Moderate Plan, No Evidence	N/A	Merits consideration with redesign to improve cost effectiveness and evidence for market transformation
5) Residential Energy Efficiency Training Center	Existing	No Information, No Evidence	Moderate Plan, Limited Evidence	Supports low-income programs and local, state, and federal energy efficiency laws and standards	Recommended pending cost-effectiveness evaluation
6) “Upstream” Windows Training Program	3rd-party	No Information, No Evidence	Weak Plan, No Evidence	N/A	Does not meet assessment criteria
7) Air Conditioning Contractor Training Program	3rd-party & out-of-state	Moderate TRC, Strong Evidence	Strong Plan, Limited Evidence	N/A	Recommended

Table 5.1.1. Summary of Residential Program Assessment and Recommendations (continued)

Program Name	Existing, New 3rd-Party, Out-of-State	Cost Effectiveness	Market Transformation	Other Criteria	Recommendation
8) Contractor Marketing Program	Existing	No Information, No Evidence	Weak Plan, No Evidence	N/A	Does not meet assessment criteria
9) California Home Energy Efficiency Rating System (CHEERS) Support Program	3rd-party & out-of-state	No Information, No Evidence	Moderate Plan, Limited Evidence	N/A	Recommended pending cost-effectiveness evaluation
10) Alliances/Branding/Labeling Program	New PY98 & out-of-state	No Information, Strong Evidence	Strong Plan, Limited Evidence	Coordinates with federal energy-efficiency market transformation programs	Recommended
11) Residential Standard Performance Contract (RSPC)	New PY98	Moderate TRC, Strong Evidence	Moderate Plan, Limited Evidence	Meets SPC Criteria	Recommended
12) "Downstream" Appliance Incentive Program	Existing & 3rd-party	Moderate TRC, Strong Evidence	Moderate Plan, Strong Evidence	Coordinates with federal energy efficiency programs. No Participant Test data but anticipated cost-effective	Recommended
13) Residential "Upstream" Incentives Program	Existing	Strong TRC, Strong Evidence	Moderate Plan, Limited Evidence	No Participant Test data but anticipated cost-effective	Recommended

Table 5.1.1. Summary of Residential Program Assessment and Recommendations (continued)

Program Name	Existing, New 3rd-Party, Out-of-State	Cost Effectiveness	Market Transformation	Other Criteria	Recommendation
14) Spare Refrigerator Recycling Program	Existing	Strong TRC, Strong Evidence	Moderate Plan, Limited Evidence	No Participant Test data but anticipated cost-effective	Recommended
15) Energy Efficiency Mortgages and Loans Program	New PY98 & 3rd-party	Moderate TRC, Strong Evidence	Moderate Plan, Limited Evidence	N/A	Recommended
16) Appliance Early Retirement	New concept	Strong CSE, Strong Evidence	Strong Plan, Limited Evidence	No Participant Test data but anticipated cost-effective	Recommended
17) Integrated Residential Retrofit (New Program Concept)	New concept	No Information, No Evidence	Weak Plan, Limited Evidence	No Participant Test data but anticipated cost-effective	Merits consideration with redesign

Table 5.1.2. Summary of Residential Program Services Provided to Market Actors

Program Name	Building Owners, Operators	Designer, Specifiers, Engineers	Contractors	Retailers, Vendors	Distributors	Manufacturers	Lending Agents	Other:
1) Residential Information and Education Program (includes a 3rd Party program)	• Information, Websites							**Schools:** • K-8 curriculum
2) Public Sector Housing Design Guidelines and Procurement Assistance	• Training • Discounted appliances				• Information	• Information • Incentives		**Local Gov't:** • Training • Standards
3) Centralized Procurement of Energy Efficient Appliances (includes a 3rd Party program)	• Procurement assistance • Financing				• Incentives	• Incentives		**Local Gov't:** • Procurement assistance
4) Audits and Surveys Program (includes several 3rd Party programs)	• Information, website • Audits	• Customer contacts	• Customer contacts					**Local Gov't:** • Information
5) Residential Energy Efficiency Training Center	• Information	• Information • Training	• Information • Training		• Information • Training	• Information • Training	• Information • Training	**Auditors:** • Information • Training
6) "Upstream" Windows Training Program (includes 3rd Party programs)	• Information, advertising		• Information • Training	• Information • Training	• Information • Training	• Information • Training		
7) Air Conditioning Contractor Training Program (includes 3rd Party programs)	• Information, advertising		• Training • Toll-free technical support line					
8) Contractor Marketing Program	• Information, advertising		• Advertising • Customer contacts					
9) California Home Energy Efficiency Rating System (CHEERS) Support Program (includes several 3rd Party programs)	• Audits • Subsidized or free CHEERS audits and ECMs		• Advertising • Provide subsidized CHEERS audits and ECMs				• Information • Alliances	**CHEERS:** • Advertising • Provide subsized CHEERS audits
10) Alliances/Branding/ Labeling Program	• Information, advertising • Labeling	• Advertising • Alliances • Labeling	• Advertising • Alliances • Labeling	• Advertising • Alliances • Labeling	• Advertising • Alliances • Labeling	• Advertising • Alliances • Labeling • Incentives		

Table 5.1.2. Summary of Residential Program Services Provided to Market Actors (continued)

Program Name	Building Owners, Operators	Designer, Specifiers, Engineers	Contractors	Retailers, Vendors	Distributors	Manufacturers	Lending Agents	Other:
11) Residential Standard Performance Contract (RSPC)	• Receive ECMs		• Information • Training • SPC financial incentives • Provide direct install ECMs	• Information • SPC financial incentives • Sell CFLs or other ECMs		• Advertising		**ESCOs, EESPs:** • SPC financial incentives • Provide direct install ECMs
12) "Downstream" Appliance Incentive Program (includes a 3rd Party program)	• Incentives			• Advertising • Labeling		• Advertising • Labeling		**Local Gov't:** • Advertising • Labeling
13) Residential "Upstream" Incentives Program	• Information			• Advertising • Labeling • Incentives	• Advertising • Labeling	• Incentives		
14) Spare Refrigerator Recycling Program	• Incentives to dispose spare refrigerator		• Advertising • Customer contacts • Dispose of spare refrig.					
15) Energy Efficiency Mortgages and Loans Program (includes a 3rd Party program)	• Information, website • Linking to HERS contractors •		• Education, training				• Training • Customer contacts • Provide subsidized loans	**Real Estate Agents, HUD:** • Education • HERS Labels • Customer contacts
16) Appliance Early Retirement (New Concept)	• Incentives to dispose of appliance		• Advertising • Customer contacts • Dispose of appliance					
17) Integrated Residential Retrofit (New Concept)	• Information • Surveys & audits • Receive integrated retrofits		• Advertising • Training • Incentives • Provide integrated retrofits				• Training • Protocols	**Local Gov't, Home Energy Raters, EESPs/ESCOs:** • Information • Training • Incentives

Table 5.1.3. Summary of Residential Program End-Uses, Technologies, Services, Practices, Market Events, Customer/Building Type, and PY98 Budget

Program Name	Energy End-Uses	Technologies, Services, or Practices	Market Event	Customer/ Building Type	PY98 California PGC DSM Budget
1) Residential Information and Education Program (includes a 3rd Party program)	All	All	**Primary:** retrofit and equipment purchase **Secondary:** new home purchase	Single- and multi-family homes, and (in SCE territory only) small commercial	$5,700,000 (some budget info not provided)
2) Public Sector Housing Design Guidelines and Procurement Assistance	Refrigeration, space heating, space cooling, cooking	Refrigerators, insulation, ovens/ranges, insulation, windows	New construction, renovation/rehab, planned replacement, emergency replacement, retrofit	Multi-family	$320,000 (out-of-state program – above figure is 3-year budget)
3) Centralized Procurement of Energy Efficient Appliances (includes a 3rd Party program)	Refrigeration, cooking	Refrigerators, ranges	New construction, renovation/rehab, planned replacement, emergency replacement, retrofit	Multi-family	$583,000
4) Audits and Surveys Program (includes several 3rd Party programs)	All	All	Equipment purchase, retrofit	All, with emphasis on single-family, high energy use, stable residents.	$8,400,000
5) Residential Energy Efficiency Training Center	HVAC, lighting, water heating, refrigeration, motors, boilers, industrial process water treatment, compressed air systems	Weatherization, insulation, duct sealing, windows, lighting, water heaters, HVAC, water-saving technologies, refrigeration, motors, wastewater treatment, compressed air systems, pumps	**Primary:** renovation/rehab **Secondary:** new construction	All, with some spillover into commercial and industrial	$1,090,000
6) "Upstream" Windows Training Program (includes several 3rd Party programs)	HVAC, lighting (daylighting)	Windows	Retrofit and new construction	Single- and multi-family	$750,000
7) Air Conditioning Contractor Training Program (includes several 3rd Party	Space heating and cooling	Duct inspection and sealing, air conditioner maintenance	Operation and maintenance	Single- and multi-family	$630,000 (total for two of five programs)

programs)					

Table 5.1.3. Summary of Residential Program End-Uses, Technologies, Services, Practices, Market Events, Customer/Building Type, and PY98 Budget

Program Name	Energy End-Uses	Technologies, Services, or Practices	Market Event	Customer/ Building Type	PY98 California PGC DSM Budget
8) Contractor Marketing Program	All	All	Retrofit	All	$580,000
9) California Home Energy Efficiency Rating System (CHEERS) Support Program (includes several 3rd Party programs)	All, with emphasis on space heating, cooling, and water heating	All	**Primary:** renovation/rehab **Secondary:** new construction	Single-family	$1,600,000
10) Alliances/Branding/ Labeling Program	HVAC, lighting, clothes washing, refrigeration, water heating	Compact fluorescent lamps, windows, clothes washers, air conditioners, refrigerators, condensing furnaces	New construction, renovation/rehab, planned replacement, emergency replacement, retrofit	Single- and multi-family, mobile homes	$5,900,000
11) Residential Standard Performance Contract (RSPC)	HVAC, lighting, water heating, motors, appliances, and more	Compact fluorescent lamps, shower heads, faucet aerators, HVAC, insulation, duct sealing, water heaters, clothes washers, refrigerators, lighting fixtures, controls, pool pumps, and more	**Primary:** retrofit, planned replacement, renovation/rehab (w/o Title 24) **Secondary:** emergency replacement	Single- and multi-family, mobile homes	$19,000,000
12) "Downstream" Appliance Incentive Program (includes a 3rd Party program)	Clothes washing, refrigeration	Clothes washers, refrigerators	Appliance purchase	Single- and multi-family, laundromats (in San Diego county only)	$3,700,000
13) Residential "Upstream" Incentives Program	Lighting, clothes washing	Lights, clothes washers	Emergency replacement, retrofit	All, with some spillover into small commercial	$5,400,000
14) Spare Refrigerator Recycling Program	Refrigeration	Scrapping old (but operable) refrigerators	Discarding an extra appliance (without replacement)	All	$7,400,000
15) Energy Efficiency Mortgages and Loans Program (includes a 3rd Party program)	All, with HVAC emphasis	All, with emphasis on insulation, air conditioning, heat pumps, and windows	**Primary:** renovation/rehab, planned replacement, retrofit **Secondary:** new	All	$3,000,000

			construction		

Table 5.1.3. Summary of Residential Program End-Uses, Technologies, Services, Practices, Market Events, Customer/Building Type, and PY98 Budget

Program Name	Energy End-Uses	Technologies, Services, or Practices	Market Event	Customer/ Building Type	PY98 California PGC DSM Budget
16) Appliance Early Retirement	Appliances	Scrapping old (but operable) appliances	Appliance purchase (scrap old appliance)	All	New program concept
17) Integrated Residential Retrofit	HVAC, lighting, water heating, appliances, miscellaneous	ditto	Operation and maintenance, renovation/rehab	Single-family	New program concept

Table 5.1.4. Summary of Residential Program Balanced Portfolio Contribution

Program Name	Vibrant Energy Efficiency Market	Promotes Direct Interaction	Upstream Market Trans	Broader Public Interest	Empower Small Com/Res Customers	Transforms Markets Expeditiously	Maximize or Leverage Benefits	Cross-Cutting Program
1) Residential Information and Education Program (includes a 3rd Party program)								
2) Public Sector Housing Design Guidelines and Procurement Assistance								
3) Centralized Procurement of Energy Efficient Appliances (includes a 3rd Party program)								
4) Audits and Surveys Program (includes several 3rd Party programs)								
5) Residential Energy Efficiency Training Center								
6) "Upstream" Windows Training Program (includes several 3rd Party programs)								
7) Air Conditioning Contractor Training Program (includes several 3rd Party programs)								
8) Contractor Marketing Program								
9) California Home Energy Efficiency Rating System (CHEERS) Support Program (includes several 3rd Party programs)								
10) Alliances/Branding/Labeling Program								
11) Residential Standard Performance Contract (RSPC)								
12) "Downstream" Appliance Incentive Program (includes a 3rd Party program)								
13) Residential "Upstream" Incentives Program								
14) Spare Refrigerator Recycling Program								

Table 5.1.4. Summary of Residential Program Balanced Portfolio Contribution (continued)

Program Name	Vibrant Energy Efficiency Market	Promotes Direct Interaction	Upstream Market Trans	Broader Public Interest	Empower Small Com/Res Customers	Transforms Markets Expeditiously	Maximize or Leverage Benefits	Cross-Cutting Program
15) Energy Efficiency Mortgages and Loans Program (includes a 3rd Party program)								
16) Appliance Early Retirement (New Concept)								
17) Integrated Residential Retrofit (New Concept)								

5.2. Residential Program Assessments and Recommendations

The residential program assessments and recommendations are based on the program summaries contained in Appendix B. Each program assessment and recommendation includes information regarding the potential for cost-effectiveness, market transformation, program balance, incentive programs, SPC programs, and related CPUC activities. Also included are program design recommendations regarding implementation, integration, and incentive levels (where applicable).

5.2.1. Residential Information and Education Program (existing)

Cost Effectiveness

Although this is an existing program, estimates of cost effectiveness or energy savings are not available.

Market Transformation Criteria

The market transformation objective of the Residential Information and Education (RIE) Program is to educate a significant portion of residential customers about the added value of energy-efficient products, practices, and services. Information is not specific to individual homes, but is intended to increase general awareness and understanding of energy-efficiency so customers are more inclined to participate in other programs or take actions on their own. While this is intended to lead to a cumulative increase in demand for energy-efficient products and services, there is no evidence that the Residential Information and Education Program is having such an effect although it has been offered in various forms for many years. No evidence is provided on how the market is changing.

The RIE Program addresses key informational barriers to energy efficiency in the residential market. The most important barrier it addresses is that of asymmetric information or opportunism by serving as an independent, objective, or trust-worthy source of information about energy-efficient product performance and savings. Limited evidence is provided to support market effects attributable to the program. No formal study of program market effects is available, but PG&E reported that in response to their March customer newsletter dedicated to residential energy efficiency, calls to their energy efficiency phone hotline almost doubled in March and April. 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. The current administrators suggest measuring the success of the RIE 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 the program but do not offer a method for doing so. No conditions for altering or withdrawing the program based on measurements of success are 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. No information is provided regarding how important underlying assumptions can be tested or evaluated.

Balanced Portfolio Criteria

This RIE Program contributes to a balanced portfolio by:

- encouraging direct interaction and negotiation between private market participants and customers by offering referrals to other providers of energy-efficient products and services;
- empowering residential customers with meaningful information on the costs and benefits of energy-efficiency measures; and
- maximizing societal and in-state energy-efficiency-related benefits achievable through PGC funding by serving a market that is large but difficult to reach because it is comprised of many millions of individual decision-makers.

Since an educated customer base is considered essential to the success of many energy-efficiency market transformation initiatives, the Residential Information and Education Program should be integrated[40] with other programs within the residential administrator area.

Incentive, SPC, Related CPUC Activities Criteria

Incentive and SPC criteria are not applicable. The Residential Information and Education Program facilitates coordination with the Electricity Customer Education Plan, the Electric Education Trust, and CPUC outreach and education activities.

Recommendation

The REI Program provides information services to residential customers. It also supports other educational activities of the CPUC. The program has a weak market transformation plan and limited evidence is provided to support the plan. No cost effectiveness information is available. The Residential Information and Education Program merits consideration only with redesign and/or integration with other programs.

Design Recommendations

While the RIE Program supports several of the balanced portfolio goals and other educational activities of the CPUC, we believe the program effectiveness could be improved if it were redesigned to increase its integration with other program offerings.

We have four recommendations for improving the existing RIE Program.

1. **Connecting customers with vendors.** Several utilities are already starting to make more explicit attempts to bring customers and vendors together. SoCalGas has a contractor referral network and SCE's saving@home Website is slated to have dealer referrals. PG&E's SmarterEnergy is an Internet service that provides customers with a searchable vendor database in addition to energy-efficient equipment purchasing guides and tips for selecting a good contractor.

[40] Integration is defined as programs (or program elements) that are formally linked by design and implementation.

2. **Referring customers to other programs,** such as appliance rebates. Many utility information programs already do this informally, but might be more effective if there were better coordination between "educational" and "marketing" efforts.
3. **Broad outreach through newsletters and the Internet.** Funding for energy-efficiency content in bill insert newsletters could be provided to all electricity providers that bill customers directly.
4. **Greater emphasis on educating customers about life-cycle costs versus first costs.** The life-cycle cost concept is key to creating lasting changes in consumer purchasing decisions.

In addition, PGC funds could be used to create a new RIE Program targeting existing home sales and remodeling.

Existing Home Sales

Approximately 550,000 existing homes were sold in California in 1997,[41] and 75 percent of those homes had a home inspection initiated by the buyer.[42] Home inspection reports typically include information about insulation, windows, and age and condition of the furnace, air conditioner, and water heater. If other energy audit elements were added to existing inspection checklists or software, the incremental cost to perform the audit would be small. Sellers will be motivated to release their billing data to help sell their home. Since the buyer is obtaining financing to purchase the home, and might also be interested in purchasing appliances (or remodeling), this is an opportune time to consider energy-efficiency upgrades. Other residential energy-efficiency programs could be promoted through this market event such as surveys and audits, energy efficiency mortgages, downstream incentives, RSPC, and alliances/branding/labeling.

Remodeling

Remodeling is a key market event when many decisions that impact energy use are made. Appliances and lighting are replaced and shell measures, such as windows and insulation, are installed or replaced. The program would work with large home improvement chains (e.g., Home Depot or Orchard Supply Hardware) to set up energy-efficiency showrooms. A small area in the store would be set aside to display sample energy-efficiency products from all end uses. Limited product samples would be available in the showroom and signs would refer the customer or contractor to the area of the store with the more comprehensive selection. A display could be set up with energy-efficient equipment fact sheets and a computer linked to the residential energy-efficiency Website. The program would provide training to store employees, offer help to identify products to stock, potentially co-fund the display or rent the store space (since floor space is valuable), and promote the energy-efficiency showrooms.

[41] Existing home sales in 1997 were 555,380, State of California Department of Real Estate Statistics.

[42] Personal communication with California Real Estate Inspection Association, Scott Clements, Inspectech Corporation, 2527 Camino Ramon, Suite 375, San Ramon, CA 94583.

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

Cost Effectiveness

No information is provided regarding cost effectiveness or energy savings.

Market Transformation Criteria

The market transformation plan is to stimulate the adoption of energy-efficient building practices in the public sector through 1) training procurement agents in life-cycle cost analysis and 2) developing efficiency standards for public housing. The program may offer incentives to manufacturers to bring down the cost of efficient refrigerators sold to public housing procurement agents to the same cost as standard efficiency units. Increasing market share of energy efficient products through government mass procurement is expected to eventually reduce the incremental cost of production and the price of targeted appliances. No evidence is provided regarding how the program will transform the market for energy efficiency in a self-sustaining way or how the market is changing.

The Public Sector Housing Design Guidelines and Procurement Assistance program addresses several key market barriers including organizational practices, information or search costs, hassle or transaction costs, misplaced or split incentives, and service or product availability. 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. The program can be altered or withdrawn depending on the degree to which public housing procurement agents 1) seek resource efficiency management services, and 2) purchase efficient appliances and equipment on a self-sustaining basis. No information is provided regarding how to test underlying assumptions.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- transforming the public housing procurement agents of residential appliances so that energy-efficient products and services are used in public sector housing;
- supporting adoption of efficient appliances in public sector housing that would not otherwise be provided by the competitive market;
- empowering public housing procurement agents with meaningful information on the costs and benefits of energy-efficiency measures and the advantages of life-cycle costing methods;
- transforming the public sector residential housing market in an expeditious manner, in view of the limited time horizon over which PGC funding is guaranteed; and
- leveraging societal and in-state energy-efficiency-related benefits achievable through PGC funding by altering the methods that public sector housing procurement agents use to make purchasing decisions.

The Public Sector Housing Design Guidelines and Procurement Assistance program overlaps both new construction and residential administrator areas. These cross-cutting issues should be considered in selecting the program portfolio.

Incentive, SPC, Related CPUC Activities Criteria

Incentive and SPC criteria are not applicable. The program supports PCG-funded low income activities.

Recommendation

The Public Sector Housing Design Guidelines and Procurement Assistance program has a moderate market transformation plan. No evidence is provided regarding how the market is changing, and no evidence is provided to support market effects. Cost effectiveness information is not available. Therefore, the program is recommended pending further study regarding cost effectiveness.

5.2.3. Centralized Procurement of Energy Efficient Appliances (New PY98 and 3rd-party)

Cost Effectiveness

No information is provided regarding cost effectiveness. However, given that the targeted technologies are cost-effective, bulk purchases will be made, and the program costs should be low, there is a strong indication that this program would be cost-effective.

Market Transformation Criteria

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 encourages these decision-makers to make cost-effective volume/aggregated purchases of energy efficient appliances rather than standard appliances. This will result in lower energy bills for apartment or public housing tenants who do not get to choose their own appliances but are usually responsible for paying for their operating costs.

The market transformation plan aims to encourage centralized purchasing/procurement authorities to purchase high-efficiency appliances for both public and private multi-family housing. California electric utility distribution companies, and other energy efficiency program administration organizations will form an informal statewide energy-efficient purchasing influence group. The group will conduct fact-finding meetings with personnel that have centralized purchasing authority to form the plan. The same purchasing authority personnel will be targeted first by the initiative. Precise program design and methodology are uncertain. Desired market effects may include the following:

- Make centralized purchasing authorities 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 energy efficient 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; and

- Develop additional manufacturer and distribution channels to serve the centralized purchasing authority markets;

The program also plans to encourage manufacturers to offer highly energy-efficient appliances and devices without arbitrary restrictions meant to discourage their sale. No evidence is provided regarding how the market for energy efficiency is changing or how to test important underlying assumptions.

The program addresses several key market barriers to the purchase of energy efficient appliances including organizational practices, performance uncertainties, information or search costs, hassle or transaction costs, access to or understanding of funding, split incentives, and product unavailability. The critical assumption is that purchasers for multi-family housing do not currently consider energy efficiency in their purchasing decisions. Public housing authorities often are forced to pay the energy bill in cases of poverty-stricken tenancy. In these situations, the split incentives typical of private multi-family housing developments do 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. Information and hassle costs of investigating the energy efficiency levels of appliances may always be a barrier for purchasing agents. However, if manufacturers and distributors internalize the task of pitching the sale of more efficient equipment, this barrier may be overcome. Follow-up surveys with procurement agents to determine purchasing decisions before and after program participation could provide useful information regarding the degree of market transformation. Manufacturer reports of increased sales of high-efficiency apartment-sized refrigerators could indicate changes in procurement patterns. However, the attribution of increased sales to the efforts of this program will be difficult to prove. The program is still under development. Limited evidence of market effects is available, but this program is being pushed nationally by the Consortium for Energy Efficiency.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- promoting a market for energy-efficient appliances in multi-family housing that can be self-sustaining without a continuing need for PGC-funded programs;
- encouraging direct interaction and negotiation between purchasing/procurement authorities and appliance manufacturers;
- transforming practices of manufacturers and distributors of appliances and purchasing agents for multi-family housing so that energy-efficient appliances are made available, promoted, and advertised by private market participants;
- promoting energy-efficient appliances to central purchasing/procurement authorities that would not otherwise be provided such information by the competitive market; and
- transforming markets in an expeditious manner, in view of the limited time horizon over which PGC funding is guaranteed.

The program is contained within the residential administrator area.

Incentive, SPC, Related CPUC Activities Criteria

Information required to evaluate the incentive portion of this program is not available.

Recommendation

The Centralized Procurement of Energy Efficient Appliances Program has a moderate market transformation plan, and limited evidence is provided to support market effects. No cost-effectiveness information is provided, but there is a strong indication that the program would be cost effective. Therefore, the program is recommended.

5.2.4. Audits and Surveys Program (existing)

Cost Effectiveness

There is strong evidence that existing programs have been weak in terms of cost effectiveness when judged by the TRC test. 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 SoCalGas' Home Energy Fitness Program. The program-budget-weighted average TRC is 0.92.

Market Transformation Criteria

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. The A&S 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. It is assumed 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. No evidence is provided regarding how the market for energy efficiency is changing or how to test important underlying assumptions.

The A&S Program addresses several key market barriers to energy efficiency including information/search costs, hassle/transaction costs, asymmetric information/opportunism, performance uncertainty, bounded rationality, and organizational practices. Formal studies of market indicators for the A&S are not yet available but are near completion. 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 A&S Program alone. Only SCE and SoCalGas provide descriptions of how and when their programs would be phased out or "exit" as the market is transformed. SCE sets certain targets and conditions which, if met, would indicate that customers no longer need Residential Energy Management Services. These targets and conditions 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. 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.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- promoting a vibrant energy-efficiency products and services industry that can be self-sustaining without a continuing need for PGC-funded programs;
- encouraging direct interaction and negotiation between customers and suppliers of energy-efficient products and services;
- providing residential customers with surveys and audits that would not otherwise be provided by the competitive market; and
- empowering residential customers with meaningful information on the costs and benefits of energy-efficiency measures.

The program is not essential to other programs. The program is contained within the residential administrator area and does not have any crosscutting issues.

Incentive, SPC, Related CPUC Activities Criteria

Not applicable.

Recommendation

Based on TRC Tests there is strong evidence that the A&S Program is weak in terms of cost-effectiveness. The program has a moderate market transformation plan. No evidence is provided regarding how the market is changing, and no evidence is provided to support market effects. Therefore, the A&S Program merits consideration with redesign to improve cost effectiveness and to provide evidence to support market transformation.

Design Recommendations

We have five recommendations for modifying the existing A&S Program to improve its market transformation potential.

1) **Target customers during key market events such as existing home sales and remodeling**. Decisions regarding energy efficiency are likely to be influenced by audits or surveys during these two market events. Customers can be reached through alliances with real estate agencies, home inspection companies, mortgage brokers, and city inspection departments and advertising at home improvement centers and lumberyards.

2) **Target homeowners who are likely to do something as a consequence of getting audit or survey results**. These homeowners can be identified from customer[43] and membership[44] databases or any number of other demographic characteristics, such as zip code. Census data

[43] Consumer databases can be purchased from many sources such as Axicom/Dataquick, Working Assets, and others.

[44] Membership databases can be purchased from organizations such as Sierra Club, Audubon Society, World Wildlife Fund, NRDC, Earth Island Network, American Association of Retired People, etc.

and past participation in programs can also be used for targeting. One implementation option is to create an on-going monthly or quarterly "energy-efficiency service" that is initiated with a comprehensive, yet low cost direct mail, Internet, or phone survey. Membership fees would support a mail-in survey program and entitle participants to discounts on energy-efficient equipment through the organization or mail order companies.

3) **Be more explicit about providing customers with purchasing information and referrals to vendors and other programs.** As with the general informational programs, some utilities are already trying to make these connections more explicit. For example, auditors in PG&E's Multi-Family Properties Energy Management Services (EMS) look for facilities that match the specifications of the RSPC Program and provide information about the program to the relevant customers. Linking customers with vendors is discussed above in the section on RIE Programs.

4) **Combine audits with direct installation of energy-efficiency measures.** Combining audits or surveys with the RSPC Program is discussed in the RSPC Program memo. Integrating audits or surveys with other programs is critical to self-sustaining market transformation objectives. This approach also reduces marketing and administrative costs and guarantees energy benefits from each audit or survey.

5) **Transition to one-time fee or paid subscription service (as noted above).** According to XENERGY, average total costs for direct-mail energy survey reports range from $10-15 for a broad ranging program similar to the volume currently provided across the California utility service areas. XENERGY worked with a confidential client outside of California in a controlled pilot program study to test customers' willingness to pay for a mail-in energy survey service. Results are shown in the following table.[45]

Offer	Customer Response
Free Service	34.4%
$10 Fee	13.5%
$25 Fee	8.2%

[45] W. Tobiasson, *New Concepts for Audit Programs.* Memorandum prepared for Robert Mowris and Associates. XENERGY, Inc., Oakland, CA. September 21, 1998.

We offer four new ideas for delivering the A&S Program.

1. **Use PGC funding to add energy audit elements to existing pre-sale home inspections.** As mentioned above, approximately 75 percent of existing-home buyers commission a general home inspection that already includes information about insulation, windows, and age and condition of the furnace, air conditioner, and water heater. If other energy-audit elements were added to existing inspection checklists or software, the incremental cost to perform the audit would be small. This approach also has the advantage of targeting an existing private sector service and the key market events discussed above. Other residential energy-efficiency programs could be promoted through this market event.
2. **Transform on-site audits into Home Energy Rating Systems (HERs) audits.** HERs audits are more thorough than a typical utility on-site audit, but also open the door to financing opportunities through Energy Efficiency Mortgages (EEMs). One type of HERS, the California Home Energy Efficiency Rating System (CHEERS) is already available in the state and is being subsidized by PCG funds.
3. **Transition to private providers of audits and surveys.** Private providers of audits and surveys can use the service to establish branding and bundled service packages. They could sell this information to private electricity providers that might use energy-efficiency audits and surveys to promote their renewable power products. This information could also be sold to HVAC, windows, or remodeling companies to promote their products and services.
4. **Develop legislation requiring audits and minimum standards when homes are sold.** Another way to ensure long-term self-sustaining implementation of audits and surveys is to develop statewide legislation requiring audits and minimum standards (such as residential energy conservation ordinances[46]) when an existing home is sold. This existing home standard could be a one-time requirement for homes built prior to 1978.[47] The audit could be performed by private home inspectors (discussed above) or local government inspectors.

The suggestions provided above are based on our understanding of how the current information and audits/surveys programs operate and our judgment regarding what activities might be most effective at transforming the residential market for energy-efficient products and services. These suggestions should be considered along with market segment or market-effects studies.

[46] San Francisco, Berkeley, and Santa Monica currently have RECOs in place requiring energy conservation upgrades when a home is sold. The San Francisco RECO requires one-time upgrades not to exceed $1,300. Required measures include: R-19 attic insulation (if existing is less than or R-11 and peak attic clearance is 18 inches or greater); R-4 insulation on first 4 ft of water heater pipe; R-6 water heater blanket with pressure relief valve; minimum R-3 duct insulation (if no asbestos); 2.5 gpm water-saving showerheads and faucet aerators; 1.6 gallon per flush toilets or toilet dam; and weatherstrip all exterior doors. Additional measures for multi-family buildings include: insulating steam and hot water circulation pipes; time clocks for boiler burners; and clean and tune boilers.

[47] Title-24 requirements apply to homes built in 1978 or thereafter.

5.2.5. Residential Energy Efficiency Training Center (existing)

Cost Effectiveness

No cost-effectiveness information is available.

Market Transformation Criteria

The Residential Energy Efficiency Center (REEC) focuses on training programs for 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 to wastewater treatment plants, new technologies for motors, lighting and refrigeration, and maintenance and operations for energy efficiency of facilities including compressed air system repairs. These training support implementation of many other programs.

The market transformation plan aims to educate design professionals who will pass their knowledge on to colleagues resulting in an increase in the demand for energy efficiency among customers. Market effects studies are not available to show evidence of transforming the market through training. In the absence of the program, many of these types of training would not be provided, but some might eventually be picked up by the private sector after development and demonstration by the Training Center. The American Architectural Manufacturers Association (AAMA) has expressed interest in building on current training efforts to provide a national window installer certification program

The Residential Energy Efficiency Training Center addresses key informational and financing barriers by working with those who make it their business to provide energy efficiency information and services to residential customers. Class participation is 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 of July 1998, PG&E's Stockton Training Center had conducted 62 classes total, with 54 of them for its own employees and eight for other unspecified market actors. As the information barrier is high and ongoing in the residential market, no conditions are anticipated under which the program could be withdrawn. The assumption is that training professionals will lead to additional energy efficiency. Follow up surveys with control groups could be used to gauge the impact of the training on the participant group.

Balanced Portfolio Criteria

The Residential Energy Efficiency Training Center contributes to a balanced portfolio by:

- promoting the energy-efficiency products and services industry by increasing the number of trained contractors;
- encouraging direct interaction between trained contractors and customers;
- supporting contractor training the competitive market would not provide; and
- empowering residential customers with meaningful information on the costs and benefits of energy efficiency measures. (The information is received through contractors as a result of the training they receive.)

The Residential Energy Efficiency Training Center is a program that cuts across Residential/Nonresidential and Retrofit/New Construction. While this program is not essential to the functioning of any other program, it provides significant support for such programs as the Residential Audits and Surveys Program, Residential Marketing/Incentives Program, Residential Standard Performance Contract, CHEERS Support Program, and Financing Program.

Incentive, SPC, Related CPUC Activities Criteria

Incentive and SPC program criteria are not applicable. The REEC facilitates coordination with PGC-funded low-income activities by providing training to weatherization installers and with local, state, and federal energy efficiency laws and standards by training quality assurance inspectors.

Recommendation

The Residential Energy Efficiency Training Center has a moderate market transformation plan with limited evidence to support market effects. No cost-effectiveness information is provided. Therefore, this program is recommended pending cost effectiveness evaluation.

5.2.6 "Upstream" Windows Training Program (3rd-party)

Cost Effectiveness

No information is provided regarding cost effectiveness or energy savings.

Market Transformation Criteria

The "Upstream" Windows Training Program provides mid- and upstream market actors with training related to the energy aspects of their products. The market transformation plan is to empower manufacturers, distributors, and dealers with the information they need to more effectively market their energy-efficient window products. The plan expects that manufacturers will provide such training themselves once it is shown that such products can increase sales and profit. The program also includes development and delivery of a customer loan program. Ultimately, the plan expects that the use of upstream training activities and loan program will increase market penetration (both speed and scope) of new energy-efficient window technologies. No evidence is provided regarding how the market is changing or might change in the absence of the program.

The program is intended to address several key market barriers for energy efficient windows including performance uncertainties, asymmetric information or opportunism, inseparability of product features, availability of financing, and information or search costs. 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. 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.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- encouraging direct interaction and negotiation between manufacturers, distributors, and vendors of windows and residential customers, building lasting relationships that will extend into the future;
- transforming the "upstream" market of manufacturers, distributors, and retailers so that energy-efficient windows are made available, promoted, and advertised by private market participants; and
- empowering residential customers with meaningful information on the costs and benefits of energy efficient windows.

The program is not an incentive program and is not essential to other programs. The program is contained within the residential administrator area.

Incentive, SPC, Related CPUC Activities Criteria

Not applicable.

Recommendation

The "Upstream" Windows Training Program has a weak market transformation plan and no evidence is provided to support market effects. No cost-effectiveness information is provided. Therefore, this program does not meet the assessment criteria.

5.2.7. Air Conditioning Contractor Training Program (3rd-party and out-of-state)

Cost Effectiveness

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). The TRC test based on these estimates is 1.18. Cost effectiveness as suggested by the estimated TRC is moderate with strong evidence.

Market Transformation Criteria

In studies by PG&E, Lawrence Berkeley Laboratory, the California Energy Commission, and others, it has been 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. The Air Conditioning Contractor Training 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 aims 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 anticipated that 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. In the absence of the program, despite the magnitude of the energy thus being lost, the number of firms offering duct inspection and repair services is small.

The program addresses several key market barriers including organizational practices, performance uncertainties, information or search costs, asymmetric information, and service unavailability. 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 versus 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 the magnitude and sustainability of changes in the attitude, knowledge, and service provider market structure brought about by the 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 that this will occur when 20 to 30 percent of HVAC installation and maintenance contractors have been trained and provided with marketing guidance and materials. The program assumes that customers are currently largely unaware of the cost effectiveness and availability of air conditioner tune-ups and duct leakage inspection and repair services. It also assumes that contractors are not currently offering these services and that the reason they are not offering the services is a lack of understanding of their potential profitability. Limited evidence is provided to verify these assumptions

Balanced Portfolio Criteria

This program contributes to a balanced portfolio in the following ways by:

- encouraging direct interaction and negotiation between HVAC and sheet metal contractors and residential customers;
- transforming the “upstream” market so that duct inspection and repair services are made available, promoted, and advertised by HVAC and sheet metal contractors; and
- empowering residential customers with meaningful information on the costs and benefits of air conditioning tune up and duct repair services.

The ACCT Program is not an incentive program and is not essential to other programs. The program is contained within the residential administrator area.

Incentive, SPC, Related CPUC Activities Criteria

Not applicable.

Recommendation

The ACCT Program has a strong market transformation plan and limited evidence is provided to support market effects. Based on TRC calculated with estimated participation and savings, the program is moderately cost-effective with strong evidence. Therefore, this program is recommended.

5.2.8. Contractor Marketing Program (existing)

Cost Effectiveness

No information is provided regarding cost effectiveness.

Market Transformation Criteria

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 market transformation plan is for the program to heighten residential consumer awareness of energy efficiency and of remodeling contractors who incorporate energy-efficient products into their projects. The market transformation plan indicates an understanding of the market for residential remodeling although it does not indicate how the market has changed or is changing. No information is provided about how the program will become self sustaining.

The program addresses several key market barriers in the residential remodeling sector including information or search costs, hassle or transaction costs, asymmetric information, and service unavailability. Contractor participation in the program is given as an indicator to measure program success. Although the program is still in the development stage, some success has been demonstrated in recruiting contractor participation It is proposed that measured changes in behavior of customers in choosing contractors, choosing energy efficient remodeling techniques, and installing energy efficient appliances be used as an indicator of program success. The program would be withdrawn when vendor expertise in energy efficiency is widespread and customers factor that expertise into their selection of a vendor. It is assumed that customers are currently largely unaware of energy efficiency opportunities in remodeling projects or how to find a qualified vendor, but no information is provided regarding how this assumption can be tested.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio in the following ways by:

- promoting a vibrant industry for energy-efficient residential remodeling services that can be self-sustaining without a continuing need for PGC-funded programs;

- encouraging direct interaction and negotiation between private market participants (particularly contractors offering energy efficiency services) and customers, building lasting relationships that will extend into the future;
- transforming the "upstream" market (residential contractors) so that energy-efficient products and services are made available, promoted, and advertised by private market participants; and
- empowering residential customers with meaningful information on the costs and benefits of energy-efficiency measures.

The Contractor Marketing Program is not an incentive program and is not essential to other programs. The program is contained within the residential administrator area although it could be expanded into the nonresidential new construction administrator area. These cross-cutting issues should be considered in selecting the program portfolio.

Incentive, SPC, Related CPUC Activities Criteria

Not applicable.

Recommendation

The Contractor Marketing Program has a weak market transformation plan. No evidence is provided how the market is changing, and no evidence is provided to support market effects. No cost-effectiveness information is provided. Therefore, this program does not meet the assessment criteria.

5.2.9. California Home Energy Efficiency Rating System (CHEERS) Support Program (new PY98, 3rd-party, and out-of-state)

Cost Effectiveness

No information on cost effectiveness is available.

Market Transformation Criteria

The CHEERS Support Program markets and subsidizes CHEERS audits. The objective of the program is to encourage wide-spread use of the California Home Energy Efficiency Rating System (CHEERS) as a means for residential customers to obtain greater access to financing for energy efficiency improvements or home purchase.

The market transformation plan aims to transform the market for energy-efficient home improvements by encouraging customers to get a CHEERS audit. The plan assumes 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 energy-efficient products and services in the residential market. The program shows an understanding of how the market is changing (or not changing). 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. Limited evidence of sustainability is provided.

The CHEERS Support Program addresses the following key market barriers: 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 and informational barriers. Market indicators reported by PG&E suggest that the program is: 1) increasing CHEERS rating volume; 2) bringing together energy consultants, raters, builders, and EPA to capitalize on the Energy Star Home Program; 3) expanding commissioning and diagnostic testing of home HVAC distribution systems and building shell air leakage; and 4) leading to many promising partnerships (with HUD/FHA, Enercomp, Federal banking regulators, USDA, Fannie Mae, The Service Institute, and redevelopment agencies). The program provides clear indicators for when support can be reduced or withdrawn, based on the progress of CHEERS toward financial self-sufficiency over the next three years.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio in multiple ways by:

- promoting a vibrant CHEERS services industry that can be self-sustaining without a continuing need for PGC-funded programs;
- encouraging direct interaction and negotiation between CHEERS service providers, financing institutions, and residential customers, building lasting relationships that will extend into the future;
- empowering residential customers with meaningful information on the costs and benefits of energy-efficiency measures and access to financing to implement those recommendations; and
- leveraging societal and in-state energy-efficiency-related benefits achievable through PGC funding by building partnerships with utilities, CHEERS, EPA, HUD/FHA, and Fannie Mae.

The CHEERS Support program is a stand-alone program, but might be more closely coordinated with the Alliances/Branding/Labeling Program within the residential administrator area. Since CHEERS can be applied to new homes, the program includes cross-cutting issues that should be considered in selecting the program portfolio.

Incentive, SPC, Related CPUC Activities Criteria

Not applicable.

Recommendation

The CHEERS Program has a moderate market transformation plan. Evidence is provided showing an understanding of the market, and limited evidence is provided to support market effects. No cost-effectiveness information is provided. Therefore, this program is recommended pending cost-effectiveness evaluation.

Design Recommendations

This CHEERS Program could be integrated with the Alliances/Branding/Labeling Program.

5.2.10. Alliances/Branding/Labeling Program (new PY98 and out-of-state)

Cost Effectiveness

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 Transformation Criteria

The Alliances/Branding/Labeling Program (ABL) 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.

The market transformation plan for the program rests on the idea that establishing and branding simple, unbiased, and reliable labels increases consumer awareness for energy-efficient products and that educating consumers about the Energy Star™ label will have a lasting effect on purchasing habits. Increased demand is expected to eventually drive down incremental costs for labeled energy-efficient equipment. The Energy Star label on computers and office equipment is widely known and has transformed the office equipment market. Other products may be able to leverage this successful branding of the Energy Star trademark. Energy Star labeling is gaining exposure in the residential sector for lighting fixtures and appliances. The program is being sponsored by multiple utilities and manufacturers are producing qualifying equipment and distributing it widely. Strong evidence is provided regarding how the market is changing based on Energy Star is becoming a highly recognized label as promoted by the Department of Energy. Strong evidence for how the market is changing is indicated by Energy Star becoming a highly recognized label as promoted by the Department of Energy.

The program addresses the following key market barriers: performance uncertainties, information or search costs, asymmetric information or opportunism, bounded rationality, and service or product unavailability. According to SDG&E participating retailers are using Energy Star training in their training classes. According to SDG&E, as well as the DOE, retailers are using Energy Star point of purchase materials to communicate 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. Underlying program assumptions can be evaluated using sales volumes of Energy Star™ equipment, customer purchasing habits, retail availability, and retail promotion of Energy Star.™ California PCG funding of the program might cease when the Energy Star™ label is recognized by most 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.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio in multiple ways by:

- promoting a vibrant energy-efficiency products and services industry that can be self-sustaining without a continuing need for PGC-funded programs. Energy Star has already done this for computers and this existing branding is helping accelerate residential efforts for lighting and appliances;
- encouraging direct interaction and negotiation between private Energy Star retailers and customers seeking energy efficient products, building lasting relationships that will extend into the future;
- transforming "upstream" manufacturers, distributors, and retailers so that Energy Star products and services are made available, promoted, and advertised by private market participants;
- providing a national recognized energy efficiency Energy Star label that would not otherwise be provided by the private sector; and
- empowering residential customers with meaningful information on the costs and benefits of energy-efficiency measures by instituting a nationally recognized certification label.

The ABL Program cuts across all three administrator areas. These cross-cutting issues should be considered in selecting the program portfolio.

Incentive, SPC, Related CPUC Activities Criteria

Incentive and SPC criteria are not applicable. The ABL Program explicitly facilitates coordination with US Environmental Protection Agency (EPA) federal energy-efficiency market transformation programs.

Recommendation

No cost effectiveness information is provided, but the program has strong evidence for cost effectiveness. The program has a strong market transformation plan, and limited evidence is provided to support market effects. In addition, the program contributes to EPA energy-efficiency market transformation programs. Therefore, this program is recommended.

5.2.11. Residential Standard Performance Contract (RSPC) Program (new PY98)

Cost Effectiveness

There is strong evidence of cost effectiveness for the RSPC program. 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) to 1.38 (SDG&E) to 1.55 (SCE). The program-budget-weighted average TRC is 1.37. Therefore the overall program group is moderately cost effective.

Market Transformation Criteria

Under this program energy efficiency service providers (EESPs) enter into a contract with the program administrator through which they receive posted prices for delivering measured or deemed energy savings. 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.

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 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. One indication of a transformed market will be customers' willingness to contribute to the cost of energy-efficiency measures. Successful entry of additional EESPs into the market is another indicator or market transformation. No evidence is available at this time on market indicators or how the market is changing. CBEE has commissioned a market effects study of the RSPC program. 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.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- promoting a vibrant energy-efficiency products and services industry that can be self-sustaining without a continuing need for PGC-funded programs;
- encouraging direct interaction and negotiation between private market participants (including energy-efficiency service providers) and customers, building lasting relationships that will extend into the future;
- empowering residential customers with meaningful information on the costs and benefits of energy-efficiency measures; and
- possibly transforming markets in an expeditious manner, in view of the limited time horizon over which PGC funding is guaranteed.

The program fits within the residential administrator area. Incentives for this market are a stand-alone program.

Incentive, SPC, Related CPUC Activities Criteria

The program meets the following requirements specified under Rule IV-7:

- identifies an element of the energy-efficiency service provider industry that will provide the services and the certification requirements of the providers;
- provides posted prices, expressed as a dollar amount per unit of energy-efficiency service provided;
- limits the share of program funds that could be received by an individual customer;
- limits the share of program funds that could be received by an individual energy-efficiency service provider;
- provides fully developed minimum requirements for customer contract language regarding terms and conditions for performance for the service provider (e.g., measurement and verification procedures, equipment maintenance, and financial transactions between the customer and the service provider); and

- identifies a process for addressing and resolving customer complaints associated with the contract between the customer and the service provider, including an identified role for the Administrator in the dispute resolution process.

Incentive and CPUC Activities criteria are not applicable.

Recommendation

There is strong evidence that the Residential SPC program is moderately cost-effective. The program has a moderate market transformation plan with limited evidence. Therefore, this program is recommended.

Design Recommendations

We have eight design recommendations regarding the following RSPC Program issues: 1) lottery system; 2) measures and primary market event; 3) deemed versus performance-based M&V payments; 4) M&V protocols; 5) customer value; 6) access to customer billing data; 7) single versus multiple administrators; and 8) self-sustaining market transformation.

1. **Lottery System.** Due to the expected 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.
   Design Recommendation
   The lottery system should be replaced with a selection process based on merit that considers: the quality of the application; market barriers; market events; end uses; measures and services;[48] marketing plans; customer contribution; cost-effectiveness; experience of the project sponsor; site control; and market transformation plan (i.e., sustainability). Specifications regarding quality standards for measure installation and energy savings should also be included in the selection criteria. The selection process should provide opportunities for small contractors to participate as project sponsors. Letting smaller amounts of money (e.g., $50,000 to $200,000) will allow small contractors to be involved.[49] The selection criteria should be explicit, and available to applicants.

2. **Measures and Primary Market Event.** Eligible short-life measures[50] include: compact fluorescent lamps, water-saving 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, dishwashers, horizontal-axis clothes washers), energy-efficient hardwired lighting fixtures (fluorescent, electronic ballasts, HID fixtures, LED exit signs), lighting controls (occupancy sensors, photocells, bypass/delay timers, time clocks), pool pump, and

[48] Customer information, education, surveys, and audits.

[49] Applications as small as $12,000 were allowed in 1998 (e.g., 20,000 therms times an incentive of $0.60 per therm).

[50] Not all measures in this list were allowed by each interim utility administrator.

hot water pipe insulation. The primary market event targeted by the RSPC Program is retrofit or planned replacement.

Design Recommendation

Water-saving showerheads and faucet aerators should be excluded from future RSPC Programs, since they are already governed by US Code,[51] and will reach full penetration without the need for PGC funds. In addition to the retrofit and planned replacement market events, the RSPC Program should target market barriers and market events associated with remodeling, emergency replacement, replace on burnout, and new equipment purchase.

3. **Deemed Payment versus Performance-Based M&V Payment.** Most of the interim utility administrators require post-installation testing and verification protocols for deemed measures to verify compliance, and make payment adjustments accordingly.[52] The 1998 performance-based M&V payment requires 12 months of post-installation billing data and time for the analyses, extending final payment by at least 12 months compared to the deemed payment. All project sponsors opted to contract for deemed payment (based on utility-prescribed energy savings, measure lifetimes, and retention study results) rather than performance-based M&V payment due to the extra time required for final payment, and the cost and risk associated with the performance-based M&V payment.

   Design Recommendation

   Installation and verification protocols should be developed for all measures to ensure proper installation, and to avoid the possibility of "kind-for-kind" replacement. The performance-based M&V payment method should be redesigned to minimize the waiting time required for final payment. Deemed savings and payments per measure should be established based on these considerations.

4. **M&V Protocols.** For the 1999 RSPC Program and beyond, project sponsors proposed having the flexibility to select International Performance Measurement and Verification Protocol[53] (IPMVP) Options A,[54] B,[55] C,[56] or D[57] depending on the particular situation. In an effort to

[51] *42 USC Sec. 6295; Title 42 – The Public Health and Welfare; Chapter 77 – Energy Conservation, Subchapter III - Improving Energy Efficiency, Part A - Energy Conservation Program for Consumer Products Other Than Automobiles*, The maximum water use allowed for any showerhead manufactured after January 1, 1994, is 2.5 gallons per minute when measured at a flowing water pressure of 80 pounds per square inch. Showerheads shall also meet the requirements of ASME/ANSI A112.18.1M-1989 (Rev. 1996), 7.4.3(a). (2) The maximum water use allowed for any of the following faucets manufactured after January 1, 1994, when measured at a flowing water pressure of 80 pounds per square inch, is as follows: Lavatory faucets 2.5 gallons per minute; Lavatory replacement aerators 2.5 gallons per minute; Kitchen faucets 2.5 gallons per minute; Kitchen replacement aerators 2.5 gallons per minute; Metering faucets 0.25 gallons per cycle.

[52] R. Mowris. *Measure Installation, Testing, and Verification Protocols* (for showerheads, duct sealing, water heater controller, attic insulation, infiltration reduction, high-efficiency water heater, and high-efficiency furnace). Prepared for Southern California Gas Company, Southern California Edison, and Pacific Gas and Electric Company. 1998.

[53] US Department of Energy. *International Performance Measurement and Verification Protocol.* Expanded Version of the 1996 North American Energy Measurement and Verification Protocol. DOE/EE-0157. December 1997.

[54] IPMVP Option A is intended for retrofits where end-use capacity, demand, or power level can be measured or stipulated with manufacturer's measurements, and energy consumption or operating hours are known in advance, stipulated, or agreed upon by both parties. Estimated energy consumption and savings are calculated under Option

negate the need for billing information for a control group, PG&E required a Trend Analysis M&V protocol using three years of billing data prior to treatment (similar to IPMVP Option C) to account for naturally occurring energy efficiency. SoCalGas required billing analysis using CADMAC M&V protocols (similar to IPMVP Option C). Edison required billing analysis using CADMAC M&V protocols (similar to IPMVP Option C), but offered to pay for all M&V studies. SDG&E required billing analysis (similar to IPMVP Option C).

Design Recommendation

Some measures such as duct sealing, infiltration reduction, refrigerators, pool pumps, and compact fluorescent lighting warrant an IPMVP Option A or B M&V protocol, while other measures such as attic insulation or energy-efficient windows warrant an IPMVP Option C or D M&V protocol. Pre- and post-installation measurement (consistent with IPMVP Option A) was optional in 1998, but should be mandatory for all measures in 1999.

5. **Customer Value.** Project sponsors indicated that M&V protocols should be designed to show individual customers that they are getting value for their money.

   Design Recommendation

   Future RSPC Programs should require customer contributions to acquaint customers with the value of energy efficiency. Educating customers about the value of energy-efficient products and practices might include offering energy audits and home energy ratings. Future RSPC Programs should also include quality standards for measures such as quality of insulation (including embodied energy), quality of fluorescent fixtures and other considerations.

A by multiplying the measured end-use capacity (i.e., kW, Btu/hr, or showerhead flow in gpm) by the stipulated (or deemed) hours of operation for each characteristic mode of operation (i.e., weekday/weekend hourly profiles) and an appropriate constant. Option A can be used with a deemed approach to estimate greater or lesser savings than assumed in the deemed approach, or to verify performance using pre- and post-installation measurements.

[55] IPMVP Option B is intended for retrofits where end-use capacity, demand, or power level can be measured baseline, and the energy consumption of the equipment or sub-system can be measured post-installation over time. Estimated energy consumption and savings are calculated under Option B using an engineering model employing input data from a statistically representative sample of program participants. The difference between Option A and B is that Option A uses one-time baseline and post-installation "snap-shot" capacity, power measurements, or stipulated energy use, whereas Option B uses portable monitoring equipment installed in a facility for a period of time or continuously to measure the in-situ, baseline and post-installation performance.

[56] IPMVP Option C encompasses whole-facility or main-meter verification procedures that provide retrofit performance verification for the projects where whole-facility baseline and post-installation data (e.g., billing data) are available to measure savings. Estimated energy consumption and savings are calculated under Option C using engineering model employing input data from a statistically representative sample of program participants.

[57] IPMVP Option D is intended for energy conservation retrofits where calibrated simulations of the baseline energy use and/or calibrated simulations of the post-installation energy consumption are used to measure savings from the energy conservation retrofit. Option D can involve measurements of energy use both before and after the retrofit for specific equipment or energy end use as needed to calibrate the simulation program. Estimated energy consumption is calculated using calibrated hourly simulation models of whole-building energy use, or equipment sub-systems in the baseline mode and in the post-installation mode and comparing the simulated annual differences for either an average weather year or for weather and operational conditions that correspond to the specific year during either the baseline or post-installation period. The primary difference between Option D and the other options is that Option D uses calibrated simulations of either the whole building or of sub-systems in the building to determine energy savings. Note that calibrated simulations are recommended under Option B in certain situations and under Option C for chillers and boilers.

6. **Access to Customer Billing Data.** Some project sponsors want access to customer billing data for marketing purposes prior to obtaining customer consent. However, utilities refuse to release billing data without first receiving customers' permission.

   Design Recommendation

   One way to overcome this problem is to send a standard customer billing data release form to all customers in a targeted geographic area or statewide that also includes a direct-mail energy survey. Customer's who grant permission to release their billing data and complete the direct-mail energy survey would then be eligible to participate in the RSPC Program. Customer billing data could be obtained by a statewide administrator or interim utility administrators, and sold at cost to project sponsors. According to XENERGY, the estimated cost for billing data is approximately $1.50 per customer,[58] and the estimated cost for direct-mail energy surveys is $10-15 per customer.[59] Another way to overcome this problem would be to target RSPC to the existing home sale market event (see below), since sellers would be motivated to release their billing data to help sell their home.

7. **Single Versus Multiple Administrators.** Project sponsors propose having one RSPC Program administrator for 1999 and beyond, so that all programs are uniform across the state. According to the project sponsors, using a single administrator might reduce administrative costs and increase incentive budgets.

   Design Recommendation

   Future RSPC interim utility administrators should use uniform contracts, guidelines, and procedures (i.e., incentives, payment methods, M&V requirements, deemed measure savings, and protocols) in order to achieve the desired level of uniformity across service territories.

8. **Self-sustaining Market Transformation.** The RSPC market transformation plan aims to develop greater customer knowledge of energy-efficiency services, build better relationships between energy-efficiency service providers (EESPs) and customers, and create more sophisticated EESP marketing and business practices. The ultimate goal is to build a fully competitive and self-sustaining market for retailers, contractors, and EESPs to deliver energy-efficiency products and services.

   Design Recommendation

   In order to become self-sustaining, future RSPC Programs should require a customer contribution, customer education, information, surveys, and audits. Targeting RSPC to specific markets (i.e., likely adopters) and existing home sales will reduce marketing costs and add energy-efficiency considerations to the process of buying or selling a home where energy-efficiency improvements are likely to be integrated into the transaction in a self-sustaining way. Approximately 550,000 existing homes were sold in California in 1997,[60] and 75 percent of those homes had a home inspection initiated by the buyer.[61] Home inspection reports typically include information about insulation, windows, and age and condition of the furnace,

[58] Personal communication with W. Tobiasson, XENERGY, Inc., September 29, 1998.

[59] W. Tobiasson, *New Concepts for Audit Programs.* Memorandum prepared for Robert Mowris and Associates. XENERGY, Inc., Oakland, CA. September 21, 1998.

[60] Existing home sales in 1997 were 555,380, State of California Department of Real Estate Statistics.

[61] Personal communication with California Real Estate Inspection Association, Scott Clements, Inspectech Corporation, 2527 Camino Ramon, Suite 375, San Ramon, CA 94583.

air conditioner, and water heater. If other energy audit elements were added to existing inspection checklists or software, the incremental cost to perform the audit would be small. Sellers will be motivated to release their billing data to help sell their home. Since the buyer is obtaining financing to purchase the home, and might also be interested in purchasing appliances (or remodeling), this is an opportune time to consider energy-efficiency upgrades offered by the RSPC Program. Other residential energy-efficiency programs could be promoted through this market event such as energy efficiency mortgages, downstream incentives, and alliances/branding/labeling.

5.2.12. "Downstream" Appliance Incentive (utility, 3rd-party, and out-of-state)

Cost Effectiveness

TRC tests were available for all three California utility programs within this program group. Moderate cost effectiveness is suggested by these TRC tests ranging from 0.26 (SDG&E Horizontal Clotheswasher Program), 1.05 (SCE Direct Rebate Program), to 1.27 (PG&E Super Cool Super Clean Program). The program-budget-weighted average TRC is 1.10. There is strong evidence for the effectiveness information in the form of past program experience and measurement and evaluation load impact studies.

Market Transformation Criteria

The Downstream Appliance Incentive (DAI) Program provides cash incentives in the form of rebates, vouchers, or discounts to customers purchasing high-efficiency refrigerators and horizontal-axis clothes washers. The program also provides marketing materials and training for appliance retailers and educational materials for customers to promote understanding of the advantages of energy-efficient appliances. 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. Use of branding programs, most notably EnergyStar, is already transforming the market. This effort complements and accelerates other efforts.

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.

The DAI Program addresses key informational barriers and increases product availability. Utilities report active (though unequal) participation in the programs. 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.

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.

The program can be withdrawn when vendor stocking and customer purchasing are determined to be adequate to continue lasting results. These indicators can be tracked to determine whether the proposed market transformation methodology is working.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- promoting a vibrant market for energy-efficient washers and refrigerators that can be self-sustaining without a continuing need for PGC-funded programs;
- encouraging direct interaction and negotiation between private market participants (retailers) and customers seeking energy efficient appliances, building lasting relationships that will extend into the future;
- transforming the "upstream" market (manufacturers and retailers) so that energy-efficient washers and refrigerators are made available, promoted, and advertised by private market participants;
- empowering residential customers with meaningful information on the costs and benefits of energy-efficient appliances;
- increasing the market share of energy-efficient washers and refrigerators in an expeditious manner, in view of the limited time horizon over which PGC funding is guaranteed; and
- leveraging societal and in-state energy-efficiency-related benefits achievable through PGC funding by coordinating with regional and national activities in the appliance market sector.

The "Downstream" Appliance Incentive program primarily targets homeowners, but also works with commercial laundry owners so it will require a low level of coordination with the nonresidential administrator.

Incentive, SPC, Related CPUC Activities Criteria

While results of the Participant Test are not available, it assumed that the program passes them since they were approved by the CPUC for 1998 and earlier. The SPC criteria is not applicable. The DAI Program facilitates coordination with local, state, regional, and federal energy efficiency programs, laws, and standards.

Recommendation

The DAI Program appears to be moderately cost-effective based on TRC tests and there is strong evidence in support of the cost effectiveness evaluation. The program has a moderate market transformation plan, and strong evidence is provided to support market effects. Therefore, this program is recommended.

5.2.13. Residential "Upstream" Incentives Program (existing and out-of-state)

Cost Effectiveness

TRC tests were available for both programs within this program group. Cost effectiveness as suggested by these TRC tests ranges from 1.06 for SDG&E Residential Fixture Program to 4.86 for PG&E's Energy Efficient Lighting Fixtures Program. The program-budget-weighted average TRC is 2.73, so the program is strongly cost effective. The savings estimates used in the TRC calculations are utility estimates based on measurement and evaluation studies, so the support for the cost effectiveness is strong.

Market Transformation Criteria

The Residential "Upstream" Incentives Program seeks to expand the market for high-quality residential compact fluorescent lighting (CFL) and lower the cost of the energy-efficient bulbs through a rebate to participating manufacturers. The program also involves 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 CFL benefits.

The market transformation plan is to use manufacturer incentive payments to temporarily decrease the price of CFLs. These incentives are expected to increase consumer acceptance of CFLs and increase availability because reduced prices will encourage retailers to stock the products. The program is based on the hope that increased demand among retailers will spur higher levels of manufacturer production, leading to lower marginal costs. Significant manufacturer investments required for new fluorescent lighting fixture product lines can only be amortized through continued production and sale of these fixtures, thus sustainably changing the market. Limited evidence for how the market for CFLs is changing is provided in a market effects study that included residential compact fluorescent lighting.[62] The study was conducted by Hagler-Bailly Consulting, Inc. for SDG&E and PG&E.

The Residential "Upstream" Incentives Program addresses several key market barriers to energy efficiency including organizational practices, performance uncertainties, information/search costs, hassle/transaction costs, and product unavailability. A markets effects study that included residential compact fluorescent lighting[63] by Hagler-Bailly Consulting, Inc. for SDG&E and PG&E, concluded that California utility programs have had some significant impacts on the market for CFLs in California. However, evidence is sparse that these impacts would persist in the absence of continued involvement. The study concludes that the program has caused permanent market effects by improving the quality of CFLs available (by specifying performance criteria) and contributing to some decline in the price of CFLs (by helping to increase demand). Once the EPA Energy Star label becomes used and recognized widely on energy-efficient 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, it is believed they will produce and market them without intervention. No evidence is provided for important

[62] RER. *Residential Market Effects Study*. San Diego, CA. June, 1998.
[63] ibid.

underlying assumptions (such as the elasticity of the consumer market for CFLs) in the market transformation plan.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- promoting a vibrant industry for energy-efficient lighting that can be self-sustaining without a continuing need for PGC-funded programs;
- transforming the "upstream" market (primarily manufacturers and retailers) so that energy-efficient lighting products are made available, promoted, and advertised by private market participants;
- empowering residential customers with meaningful information on the costs and benefits of energy-efficiency lighting; and
- transforming the market for energy efficient residential lighting in an expeditious manner, in view of the limited time horizon over which PGC funding is guaranteed.

The Residential "Upstream" Incentives Program is contained within the residential administrator area.

Incentive, SPC, Related CPUC Activities Criteria

Insufficient information is available to evaluate the incentive portion of this program. SPC criteria are not applicable. The program supports related CPUC activities by increasing the use of energy efficient lighting in the residential sector.

Recommendation

The Residential "Upstream" Incentives Program appears to be strongly cost-effective based on TRC tests and strong evidence is available to support the cost effectiveness. The program has a moderate market transformation plan, and limited evidence is provided to support market effects. Therefore, this program is recommended.

5.2.14. Spare Refrigerator Recycling Program (existing)

Cost Effectiveness

Strong evidence of cost effectiveness is provided for this program by a TRC of 1.7 based on prior measurement and evaluation studies.

Market Transformation Criteria

The Spare Refrigerator Recycling (SRR) Program provides a small incentive to customers who dispose of operable spare refrigerators in an environmentally responsible, energy-saving manner. The program subsidizes a turnkey recycling company to pick up and properly dispose of the refrigerators. The market transformation plan aims to remove as large a percentage as possible of the 300,000 to 500,000 inefficient CFC refrigerators from the used refrigerator market and homeowners garages and basements. The goal is to accomplish this removal within five years.

The SRR Program demonstrates an understanding of the used appliance market. A 1997 XENERGY/PCS study (see Program Summary for reference) 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. While the program does not show evidence of transforming the market in a self-sustaining way, this might not be relevant if the goal is to remove the 300,000 to 500,000 inefficient CFC refrigerators from the used refrigerator market.

The Spare Refrigerator Recycling Program addresses the market barriers of hassle or transaction costs, bounded rationality, service or product unavailability, and (most importantly) externalities. Between January and the end of May 1998, approximately 11,000 appliances were recycled. 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 the 300,000 to 500,000 old inefficient CFC refrigerators are removed from the used refrigerator market and recycled.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio in several ways by:

- supporting refrigerator recycling that would not otherwise be provided by the competitive market;
- transforming the used refrigerator market in an expeditious manner by recycling and removing spare inefficient CFC refrigerators; and
- maximizing societal and in-state energy-efficiency-related benefits achievable through PGC funding by destroying inefficient refrigerators so they cannot return to service.

The SRR Program is contained within the residential administrator area.

Incentive, SPC, Related CPUC Activities Criteria

SPC and Related CPUC Activities criteria are not applicable. Results of the Participant Test are not available but are assumed to be favorable as SCE's Residential Spare Refrigerator Recycling program has been approved by the CPUC in prior years.

Recommendation

There is strong evidence that the Spare Refrigerator Recycling Program is strongly cost-effective based on TRC tests. The program has a moderate market transformation plan. Limited evidence is provided showing an understanding of the market, and limited evidence is provided to support market effects. Therefore, this program is recommended.

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

Cost Effectiveness

TRC tests were available for two out of three programs within this program group and are based on data from past measurement and evaluation studies. 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) to 1.01 (SCE Residential Financing). The program budget weighted average TRC is 1.00. Cost-effectiveness is moderate with strong evidence.

Market Transformation Criteria

The three programs included under the "umbrella" program concept of Energy Efficiency Mortgages and Loans each seek to improve the market penetration of energy efficient technologies in the residential retrofit market. They do this through different means and target different sub-sectors of the residential market. PG&E's Comfort Link program and SCE's Residential Financing Program offer low cost loans to a broad market. The PG&E 3rd Party Energy Awareness Housing Agents Program (EAHAP) targets first-time and low-income home buyers and offers energy efficient mortgages rather than smaller, home improvement loans. The EAHAP strategy is unique in that it attempts to intervene at a critical juncture, the home purchase, when homeowners may be more willing to make improvements and the incremental monthly payment for investing in energy efficiency is small.

The program as a whole is intended to transform the market for home improvement loans to support low-interest financing for energy-efficiency improvements. By allowing lenders and customers to finance the purchase and installation of energy-efficient equipment, it is assumed that customers will find that the purchase of energy-efficient equipment to be more attractive than standard equipment. It is further expected that 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. Limited evidence is provided regarding how the program will transform the market for energy efficiency in a self-sustaining way and no evidence is presented regarding how the market is changing.

The Energy Efficiency Mortgages and Loans Program addresses key market barriers to energy efficiency including performance uncertainties, information costs, hassle/transaction costs, access to or understanding of financing, and service/product unavailability. Continued program 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. Formal studies of market indicators for the program are not available, however, PG&E indicates that several organizations have formulated and implemented financing programs patterned after its pilot program. Subsidies will be gradually phased out as the pace of loan activity is sustained with the declining subsidies. No information is provided regarding how important underlying assumptions can be tested or evaluated.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- promoting a vibrant energy-efficiency products and services financing industry that can be self-sustaining without a continuing need for PGC-funded programs;
- encouraging direct interaction and negotiation between private financing institutions and customers, building lasting relationships that will extend into the future;
- transforming providers of energy efficiency loans so that energy-efficient products and services are made available, promoted, and advertised by private market participants; and

- empowering residential customers with meaningful information on the costs and benefits of energy-efficiency measures and the availability of loans for energy efficiency improvements.

The program is not essential to other programs. The program is contained within the residential administrator area.

Incentive, SPC, Related CPUC Activities Criteria

Not applicable.

Recommendation

The Energy Efficiency Mortgages and Loans Program is moderately cost effective with strong evidence. The program has a moderate market transformation plan. No evidence is provided how the market is changing, and limited evidence is provided to support market effects. Therefore, this program is recommended.

Design Recommendations

Future programs will benefit from the inclusion of multiple financing options, including loans and mortgages. The energy efficiency mortgage concept should be expanded to the entire existing home sales market, rather than only first-time and low-income home buyers.

5.2.16. Appliance Early Retirement Program[64] (new concept)

Cost Effectiveness

Strong cost effectiveness is indicated based on levelized cost of saved energy calculations showing 0.017 $/kWh. Studies of the energy-use savings for old refrigerators and the size of the appliance market in California provide strong evidence for significant energy savings potential from this program.

Market Transformation Criteria

The Appliance Early Retirement Program is designed to complete the realization of improvements in the stock of residential appliances in use by electric service customers by capturing these appliances at the end of the "first use" segment of the product life-cycle, preventing their return to service. The program demonstrates a thorough understanding of the used appliance market and provides evidence that the market will not support early retirement in the absence of publicly supported subsidies or other intervention.

Long-term market transformation relies on the development and implementation of a comprehensive "product responsibility" scheme by appliance manufacturers, materials suppliers, distributors, and consumers to self-finance this activity. In order to achieve this goal, the Appliance Early Retirement Program requires that manufacturers, distributors, retailers and consumers receiving PGC funding through appliance programs participate and establish a self-financing "product responsibility" system for future activities. While the experience of the Spare Refrigerator Recycling Program (see Program Summary and Assessment) suggests that the

[64] Program concept submitted Glynnis Jones, Appliance Recycling Centers of America (ARCA), Sacramento, CA.

Appliance Early Retirement Program could accomplish its primary task, it is less clear how program activities other than informational efforts will lead to the "product responsibility system" required for transformation of the market in a self-sustaining way.

The Appliance Early Retirement Program addresses informational, service availability, and misplaced/split incentives market barriers. It also addresses externalities, although this barrier was not mentioned by the concept sponsors. The program provides methods for assessing intermediate indicators of success at reducing these market barriers. However, the ultimate indicator of program success (a comprehensive "product responsibility" scheme is adopted by the appliance industry) might not be a "natural" outcome of program activities. The proposed program plan provides limited information regarding assumptions that underlie the market transformation plan and how underlying assumptions may be tested.

Balanced Portfolio Criteria

This Appliance Early Retirement Program contributes to a balanced portfolio by:

- transforming "upstream" appliance manufacturers, materials suppliers, and distributors so a comprehensive "product responsibility" scheme is developed, promoted, and advertised by private market participants;
- supporting activities that would not otherwise be provided by the competitive market; and
- maximizing societal and in-state energy-efficiency-related benefits achievable through PGC funding by destroying inefficient appliances so they cannot return to service elsewhere.

The Appliance Early Retirement Program must be offered in concert with other appliance efficiency programs within the residential administrator area in order to achieve its market transformation goals.

Incentive, SPC, Related CPUC Activities Criteria

SPC and Related CPUC Activities criteria are not applicable. Results of the Participant Test are not available as this is a new program concept, but are likely to be favorable as a similar program (Spare Refrigerator Recycling) has been approved by the CPUC in prior years.

Recommendation

Strong cost effectiveness is indicated and strong evidence regarding cost effectiveness is provided for the Appliance Early Retirement Program. The program has a strong market transformation plan. Limited evidence is provided to support market effects. Therefore, the program is recommended.

5.2.17. Integrated Residential Retrofit[65] (new concept)

Cost Effectiveness

No information is provided regarding cost effectiveness of this new program concept.

[65] Program concept submitted by the California Energy Commission.

Market Transformation Criteria

The Integrated Residential Retrofit (IRR) Program is proposed to integrate customer information, surveys, audits, and diagnostics to identify energy, durability, and health and safety problems and prioritize recommended residential retrofit work based on test results and desired performance objectives. The program will use contractors to apply energy efficiency improvements in homes. The incremental costs of using the testing procedures would be paid with program funds. It is proposed that as the contractors become comfortable with the performance-based approach, they will be encouraged to guarantee reduced energy bills or improved comfort. This program is designed to help contractors and energy service companies learn how to identify and facilitate appropriate improvements in residences, allowing them broaden their line of products and services. Contractors will be motivated to learn and apply new methods to improve building performance during retrofit projects.

The program asserts that while some contractors are using performance testing, and a few offer bill guarantees, they are niche players. The market transformation plan aims to develop a sustainable consumer demand for an integrated performance-based approach to residential energy retrofits. It is assumed that increased marketing and information about the 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 is intended to allow the manufacturing and distribution sector to lower wholesale prices. The market transformation effort is expected to 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, with an energy bill and comfort guarantee. The program plan shows an understanding of the current market and players.

The IRR Program has the potential to addresses several key market barriers to energy efficiency including organizational practices, performance uncertainties, information costs, hassle costs, and product availability. It is proposed that as capital and labor costs fall, the guarantee program will be profitable without subsidies, therefore continued payment for incremental participation costs and other program assistance can be withdrawn. The key assumptions of the market transformation plan are that; 1) program contractors will gain market share/profits through use of a performance-based approach and 2) 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.

Limited evidence to support the market transformation plan is provided. The plan indicates that some contractors are currently using performance-based or integrated methods, but that further incentives and education are needed. The energy savings that are given as an indicator of the effect of building monitoring are for a weatherization program in New York, not a program that uses an integrated approach. No support is provided for the underlying assumption that an integrated approach including verification of savings can be taken from the new construction market and be cost effectively applied to the residential retrofit market. No information is provided to indicate how the residential retrofit market is changing or how these changes would affect the program.

Balanced Portfolio Criteria

This program has the potential to contribute to a balanced portfolio by:

- promoting a vibrant energy-efficiency products and services industry that can be self-sustaining without a continuing need for PGC-funded programs;
- encouraging direct interaction and negotiation between contractors and residential customers, building lasting relationships that will extend into the future;
- empowering residential customers with meaningful information on the costs and benefits of energy-efficiency retrofit measures; and
- leveraging societal and in-state energy-efficiency-related benefits achievable through PGC funding by increasing consumer demand for residential energy efficiency.

The program is not essential to other programs. The program may complement the Residential SPC Program or the Integrated Systems Residential New Construction Program. The program includes cross-cutting issues that should be considered in selecting the program portfolio.

Incentive, SPC, Related CPUC Activities Criteria

Information required to evaluate the incentive portion of this program is not available.

Recommendation

No cost effectiveness information is provided for the program. The IRR Program has a weak market transformation plan. Limited evidence is provided to support market effects. Therefore, the program merits consideration with redesign.

6. New Construction Program Administrator Area

This chapter contains the following sections:

- New Construction Program Recommendations, Services Provided to Market Actors, Program Summary Tables, and Balanced Portfolio Contribution; and
- New Construction Program Assessments.

6.1. New Construction Program Recommendations, Services Provided to Market Actors, Program Summary Tables, and Balanced Portfolio Contribution

This section provides a summary of recommendations for each of the 15 New Construction Programs. The rules in Section 3.3.5 are used to make program recommendations. Recommendations are listed below and summarized in Table 6.1.1. This section also includes a summary of program services provided to market actors in Table 6.1.2, program summary tables of end uses, technologies, services, practices, market events, customer/building type, and PY98 budget in Table 6.1.3, and a summary of each program's contribution to a balanced portfolio in Table 6.1.4.

6.1.1. Highly Recommended Programs

No programs are highly recommended.

6.1.2. Recommended Programs

The following programs are recommended.

- Standards and Protocols Program;
- Residential Marketing/Incentives Program;
- Nonresidential Incentives/Marketing Program;
- Nonresidential Design Assistance Program;
- Premium Efficiency Relocatable Classrooms Demonstration Program;
- Developing Green Communities;
- New Construction Nonresidential Standard Performance Contract (New Concept); and
- Integrated Systems Residential New Construction Program (New Concept).

6.1.3. Programs Recommended Pending Cost-Effectiveness Evaluation

The following programs are recommended pending cost-effectiveness evaluation and may need redesign in order to improve cost effectiveness.

- Design Tools and Practices;
- Energy Centers;
- Title 24 Enforcement Education Program;
- Residential/Small Commercial Demonstration; and
- Commercial/Industrial/Agricultural Demonstration Program.

6.1.4. Programs Recommended Pending Further Study

No programs are recommended pending further study.

6.1.5. Programs that Merit Consideration with Redesign

The following program merits consideration with redesign.

- Energy Efficient Manufactured Housing Promotion;

6.1.6. Programs (or Program Concepts) That Do Not Meet Assessment Criteria

The following program could not be recommended based on the criteria, methodology, and rules defined in Sections 3.1, 3.2, and 3.3.

- Residential Design Assistance Program.

6.1.7. Services Provided to Market Actors and Program Summary Tables

A summary of new construction program services provided to market actors is shown in Table 6.1.2. This summary table shows both the services provided to market actors as well an indication of which actors provide these services.[66] A summary of new construction program end uses, technologies, services, practices, market events, customer/building type, and PY98 budget is shown in Table 6.1.3.

6.1.8 Summary of Contribution to Balanced Portfolio

Each program's contribution to a balanced portfolio and cross-cutting programs that overlap more than one Administrator are shown in Table 6.1.4. The potential for contributing to a balanced portfolio can only be assessed when the program portfolio is selected. A pass/fail assessment is made of each program's potential contribution to a balanced portfolio, but no attempt is made to judge the quality of that contribution relative to each of the other programs.

The following cross-cutting programs overlap more than one Administrator:

- Design Tools and Practices (nonresidential, residential, and new construction);
- Energy Centers (nonresidential, residential and new construction);
- Standards and Protocols Program (nonresidential, residential, and new construction);
- Residential/Small Commercial Demonstration Program (nonresidential, residential, and new construction); and
- Commercial/Industrial/Agricultural Demonstration Program (nonresidential and new construction).

[66] Market actors providing services are not identified for programs where the services are provided by interim administrator staff .

Table 6.1.1. Summary of New Construction Program Assessment and Recommendations

Program Name	Existing, New 3rd-Party, Out-of-State	Cost Effectiveness	Market Transformation	Other Criteria	Recommendation
1) Energy-Efficient Manufactured Housing Promotion	Out-of-state	No Information	Weak Plan, Limited Evidence	N/A	Merits consideration with redesign
2) Design Tools and Practices	New PY98	No Information	Moderate Plan, Limited Evidence	N/A	Recommended, pending cost effectiveness evaluation
3) Energy Centers	Existing	No Information	Moderate Plan, Strong Evidence	N/A	Recommended, pending cost effectiveness evaluation
4) Title 24 Enforcement Education Program	3rd-party & out-of-state	No Information	Moderate Plan, Limited Evidence	Supports state energy codes	Recommended, pending cost effectiveness evaluation
5) Standards and Protocols Program	New PY98, 3rd-party, out-of-state	No Information, Strong Evidence	Strong Plan for transforming the market for individual technologies, Limited Evidence	Supports state and federal energy codes	Recommended
6) Residential Marketing/Incentives Program	Existing & 3rd-party	Moderate TRC, Strong Evidence	Moderate Plan, Limited Evidence	Supports state, regional, and federal energy efficiency programs. No participant test data, but anticipated cost-effective	Recommended
7) Nonresidential Incentives/Marketing Program	Existing	Strong TRC, Strong Evidence	Moderate Plan, Limited Evidence	No participant test data, but anticipated cost-effective	Recommended
8) Residential Design Assistance	New PY98	No Information	Weak Plan, No Evidence	N/A	Does not meet assessment criteria

Table 6.1.1. Summary of New Construction Program Assessment and Recommendations (continued)

Program Name	Existing, New 3rd-Party, Out-of-State	Cost Effectiveness	Market Transformation	Other Criteria	Recommendation
9) Nonresidential Design Assistance	Existing	Strong TRC, Strong Evidence	Moderate Plan, Limited Evidence	Supports local, state, and federal laws and standards	Recommended
10) Residential/Small Commercial Demonstration Program	New PY98, 3rd-party	No Information	Moderate Plan, Limited Evidence	N/A	Recommended, pending cost-effectiveness evaluation
11) Commercial/Industrial/Agricultural Demonstration Program	Existing	No Information	Moderate Plan, Limited Evidence	N/A	Recommended, pending cost-effectiveness evaluation
12) Premium Efficiency Relocatable Classrooms (PERC) Demonstration Program	New PY98	No Information, Strong Evidence	Strong Plan, Limited Evidence	N/A	Recommended
13) Developing Green Communities	New PY98 & 3rd-party	Strong TRC, Strong Evidence	Moderate Plan, Limited Evidence	Supports local and regional energy efficiency programs	Recommended
14) New Construction Nonresidential Standard Performance Contract	New concept	No benefit-to-cost ratio, Strong Evidence for Predicted Savings	Strong Plan, Limited Evidence	No Participant Test data but anticipated cost effective. Expected to meet all SPC program requirements. Supports local, state, federal energy efficiency programs.	Recommended

15) Integrated Systems Residential New Construction Program	New concept	No benefit-to-cost ratio, Strong Evidence for Predicted Savings	Strong Plan, Limited Evidence	No Participant Test data, but anticipated cost effective.	Recommended

Table 6.1.2. Summary of New Construction Program Services Provided to Market Actors

Program Name	Residential Building Owners	CIA Building Owners, Operators	Designers, Specifiers, Engineers	Builders	Contractors	Lending Agents	Other:
1) Energy-Efficient Manufactured Housing Promotion	• Mass marketing and other educational activities					• Provide financing	**Retailers:** • Sales training
2) Design Tools (includes a 3rd Party program)		• Design tools & training	• Design tools & training				**Students:** • Design awards
3) Energy Centers		• Information, seminars, demos • Project assistance, 3rd party experts	• Information, seminars, demos • Project assistance, 3rd party experts	• Information, seminars, demos • Project assistance, 3rd party experts	• Information, seminars, demos • Project assistance, 3rd party experts		**ESCOs:** • Information, seminars, demos • Project assistance
4) Title 24 Enforcement Training Program (includes a 3rd Party program)							**Local Government, Building Inspectors:** • Training
5) Standards and Protocols Program (includes a 3rd Party program)		• Voluntary design guidelines	• Voluntary design guidelines				**Government:** • New Energy Standards
6) Residential Marketing/Incentives Program (includes several 3rd Party programs)	• Information, advertising • Labeling			• Marketing • Incentives in PG&E area • Support for labeling		• Promotion of HERs and Energy Efficient Mortgages	**Realtors:** • Sales training
7) Nonresidential Incentives/Marketing Program		• Information, advertising • Incentives to exceed Stds.	• Provide subsidized technical assistance				
8) Residential Design Assistance	• Design review • Informational brochures		• Provide subsidized design review	• Education • Design review			

Table 6.1.2. Summary of New Construction Program Services Provided to Market Actors (continued)

Program Name	Residential Building Owners	CIA Building Owners, Operators	Designers, Specifiers, Engineers	Builders	Contractors	Lending Agents	Other:
9) Nonresidential Design Assistance			• Provide subsidized design review, simulation modeling, financial analysis	• Project-specific design assistance	• Project-specific design assistance		
10) Residential/Small Commercial Demonstration Program	• Demos • Info on new technologies • Receives Incentives	• Demos • Info on new technologies • Receives Incentives			• Info on new technologies • Demos		**ESCOs:** • Demos • Info on new technologies
11) Commercial/Industrial/ Agricultural Demonstration Program		• Demos • Information on new technologies • Incentives to participate			• Info on new technologies • Demos		**ESCOs:** • Info on new technologies • Demos
12) Premium Efficiency Relocateable Classrooms (PERC) Demonstration Program		• Education for school purchasing agents • Demos					**Manufacturer:** • Product development assistance • Incentives
13) Developing Green Communities	• Information	**Municipal Building Owners:** • Information, advertising, Websites, demos		• Information, advertising • Demos			**Community Planners, Land & Community Developers:** • Information, training, tools, demos, project assistance, 3rd party experts

Table 6.1.2. Summary of New Construction Program Services Provided to Market Actors (continued)

Program Name	Residential Building Owners	CIA Building Owners, Operators	Designers, Specifiers, Engineers	Builders	Contractors	Lending Agents	Other:
14) New Construction Nonresidential Standard Performance Contract (SPC) (New Concept)		• Information • SPC incentives	• Information • SPC incentives • Provide design services				
15) Integrated Residential Guaranteed Bill Program (New Concept)	• Guaranteed energy bills • Information, education, advertising			• Training & tools • Marketing • Provide guaranteed energy bills	• Training & tools	• Information	**Real Estate Agents, Building Departments, Manufacturers Home Energy Raters:** • Information

Table 6.1.3. Summary of New Construction Program End-Uses, Technologies, Services, Practices, Market Events, Customer/Building Type, and PY98 Budget

Program Name	Energy End-Uses	Technologies, Services, or Practices	Market Event	Customer/ Building Type	PY98 California PGC DSM Budget
1) Energy-Efficient Manufactured Housing Promotion	HVAC, lighting, refrigeration, water heating, cooking	HVAC, lighting, windows, insulation, building systems, appliances, water heaters	New construction	**Customer:** Residential; **Building Type:** manufactured homes	NEEA 3-year budget of $1.4 million. Covers half of project costs: remainder provided by venture partners and revenues.
2) Design Tools (includes a 3rd Party program)	Space heating, cooling, lighting, refrigeration, controls	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	**Primary:** new construction; **Secondary:** renovation with or without Title 24	All sizes of commercial and industrial buildings	$5,400,000 not including SCE 3rd-Party program)
3) Energy Centers	HVAC, lighting, water heating, refrigeration, miscellaneous equipment.	Efficient building/facility design, energy system interactions, HVAC, lighting, daylighting, windows, appliances, efficient technologies, and controls.	New construction, renovation, planned replacement, retrofit.	All commercial and residential building types	$2,000,000 (includes new Energy Information Center studies)
4) Title 24 Enforcement Training Program (includes a 3rd Party program)	HVAC, lighting, water heating	Insulation, windows, furnaces, air conditioners, water heaters	**Primary:** new construction; **Secondary:** retrofits involving Title 24	**Customers:** residential and commercial; **Building Types:** all buildings under Title 24	Not available.

Table 6.1.3. Summary of New Construction Program End-Uses, Technologies, Services, Practices, Market Events, Customer/Building Type, and PY98 Budget

Program Name	Energy End-Uses	Technologies, Services, or Practices	Market Event	Customer/ Building Type	PY98 California PGC DSM Budget
5) Standards and Protocols Program (includes a 3rd Party program)	All, but primary focus on space heating and cooling	Boilers, condensing boilers, water heaters, double effect absorption chillers, R-19 ceiling insulation, A/C - engine driven, flue heat retriever	**Primary:** new construction; **Secondary:** retrofit involving Title 24	All commercial and residential	$240,000 for PG&E program. Budget not provided for SoCalGas 3rd Party Program.
6) Residential Marketing/Incentives Program (includes several 3rd Party programs)	All, but with emphasis on HVAC, windows, water heating, appliances	All, but with emphasis on efficient central air conditioning, duct sealing, high-performance windows, natural gas cooking, clothes dryers, and water heating	New construction	Residential single family and (in SoCalGas and PG&E territory) multi-family	$9,500,000 not including budget for 3rd-Party programs
7) Nonresidential Incentives/Marketing Program	All	No particular technologies listed	**Primary:** new construction; **Secondary:** major retrofits involving Title 24	All commercial, all sizes	$6,050,000
8) Residential Design Assistance	All, but focus on lighting	All, but focus on fluorescent fixtures designed for residential applications	New construction	Single family homes	$350,000
9) Nonresidential Design Assistance	All	All	New construction	All commercial and industrial, but focused on larger customers	$4,700,000
10) Residential/Small Commercial Demonstration Program	Space heating, space cooling, water heating, cooking, process, other	All, but targets geothermal and air-source heat pumps, evaporative coolers, high efficiency air conditioning, low water/energy dishwashers, furnace blower motors, and	New construction, retrofit	**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	$3,000,000 doesn't include budget for SCE High Efficiency Air Conditioning Showcase Program

		domestic water heaters.			

Table 6.1.3. Summary of New Construction Program End-Uses, Technologies, Services, Practices, Market Events, Customer/Building Type, and PY98 Budget

Program Name	Energy End-Uses	Technologies, Services, or Practices	Market Event	Customer/ Building Type	PY98 California PGC DSM Budget
11) Commercial/Industrial/ Agricultural Demonstration Program	Space heating, space cooling, process, other	All, with particular emphasis on HVAC, boilers, process technologies, remote monitoring and control, motors	New construction, retrofit	Large commercial, industrial, and agricultural	$6,000,000
12) Premium Efficiency Relocatable Classrooms (PERC) Demonstration Program	HVAC, lighting envelope	Evaporative cooling, high efficiency fluorescent lighting, efficient heat pumps, low-e windows, skylights, radiant barriers, insulation	New construction	Small commercial – classrooms	$350,000
13) Developing Green Communities	All	All, with emphasis on narrow streets, tree planting, reducing street lighting, north-south building orientation, overhanging roofs, tree shading, natural drainage systems, and drought-resistant vegetation	New construction	All, but with emphasis on residential subdivision developments, commercial and industrial parks	$1,300,000 includes two 3rd Party and one California utility programs
14) New Construction Nonresidential Standard Performance Contract (SPC) (New Concept)	HVAC, lighting, water heating, miscellaneous end uses	High efficiency HVAC, lighting, daylighting, water heating, windows, insulation, building shell, building controls.	New construction	Commercial--all building types	New Program Concept (CEC proposes $1 million or $100K to $250K per design team)
15) Integrated Residential Guaranteed Bill Program (New Concept)	Initially, HVAC, lighting, water heating, ultimately all residential end uses.	Systems approach to improve envelope, lighting, reduce ductwork and equipment size, improve efficiency and building durability, and reduce capital costs.	Construction and sale of new single family homes.	Residential single family	New Program Concept (Developed by the CEC)

Table 6.1.4. Summary of New Construction Program Balanced Portfolio Criteria

Program Name	Vibrant Energy Efficiency Market	Promotes Direct Interaction	Upstream Market Trans	Broader Public Interest	Empower Small Com/Res Customers	Transforms Markets Expeditiously	Maximize or Leverage Benefits	Cross-Cutting Program
1) Energy-Efficient Manufactured Housing Promotion (Out-of-State Program)								
2) Design Tools and Practices (includes a 3rd Party program)								
3) Energy Centers								
4) Title 24 Enforcement Education Program (includes a 3rd Party program)								
5) Standards and Protocols Program (includes a 3rd Party program)								
6) Residential Marketing/Incentives Program (includes several 3rd Party programs)								
7) Nonresidential Incentives/Marketing Program								
8) Residential Design Assistance								
9) Nonresidential Design Assistance								
10) Residential/Small Commercial Demonstration Program								
11) Commercial/Industrial/Agricultural Demonstration Program								
12) Premium Efficiency Relocateable Classrooms (PERC) Demonstration Program								
13) Developing Green Communities								
14) New Construction Nonresidential Standard Performance Contract (New Concept)								
15) Integrated Systems Residential New Construction Program (New Concept)								

6.2. New Construction Program Assessments and Recommendations

The new construction program assessments and recommendations are based on the program summaries contained in Appendix B. Each program assessment and recommendation includes information regarding the potential for cost-effectiveness, market transformation, program balance, incentive programs, SPC programs, and related CPUC activities. Also included are program design recommendations regarding implementation, integration, and incentive levels (where applicable).

6.2.1. Energy-Efficient Manufactured Housing Promotion (out-of-state)

Cost Effectiveness

No information is provided regarding cost effectiveness or potential energy savings.

Market Transformation Criteria

The Energy-Efficient Manufactured Housing Promotion Program (EEMHP) uses mass marketing, retailer sales training, and other educational activities to increase the market share and maintain infrastructure support for manufactured homes with energy efficiencies over 30% above the national standard. The market transformation plan is based on the idea that an educated consumer population will demand highly energy-efficient manufactured housing and this will "trickle-up" to manufacturers. The plan provides an indication of how the market is changing (at least in the Northwest) by reporting that sales of highly energy-efficient manufactured homes slipped to 75% of the market after being at 100% penetration when the Super Good Cents incentive/promotion program (sponsored by Bonneville Power Administration) ended. There is limited evidence as to whether the EEMHP can transform the market for manufactured housing in a self-sustaining way.

The EEMHP addresses barriers in its targeted market, including organizational practices or customs, performance uncertainties, information or search costs, asymmetric information or opportunism, access to financing, and service or product unavailability. Access to financing is only addressed indirectly. Underlying assumptions for the combined incentive/information program were successfully tested through the Super Good Cents program, but there is no evidence yet available to support the market transformation effect of the altered program (without incentives). Also, the measures promoted through the program need to be evaluated to show that they result in a substantially more efficient unit that what is typically sold in California. The program could be withdrawn when and if manufacturers and builders themselves advertise the merits of energy efficiency competitively, and if consumers continually respond to these efforts by demanding energy-efficient homes. Market penetration of highly energy efficient manufactured homes is suggested as an indicator of these conditions.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- encouraging direct interaction and negotiation between manufactured home retailers and customers, building lasting relationships that will extend into the future;

- targeting retailers and (indirectly) manufacturers so that energy-efficient manufactured homes
- empowering residential customers with meaningful information on the costs and benefits of
- transforming the market for manufactured homes in an expeditious manner, in view of the goals within two years in the Pacific Northwest).

The EEMHP is a stand-alone program fully contained within the new construction administrator area.

Incentive, SPC, Related CPUC Activities Criteria

Not applicable.

Recommendation

The Energy-Efficient Manufactured Housing Program provides no cost effectiveness information. The program has a weak market transformation plan with limited evidence. Therefore, the program merits consideration with redesign to assess cost-effectiveness and demonstration that it is appropriate to the California market where manufactured homes must already meet Title 24 efficiency standards.

6.2.2. Design Tools and Practices (new PY98)

Cost Effectiveness

No information is provided regarding cost effectiveness or energy savings.

Market Transformation Criteria

The Design Tools and Practices Program provides energy efficiency software tools, training, and demonstrations for architects, design professionals, and end-users. The objective is to make it easier for market actors to develop a quantifiable basis for comparison between standard and high efficiency options. The Design Tools and Practices market transformation plan assumes that if designers have tools to help them perform energy simulations and other tasks more quickly and easily, they will be more likely to do so. If these tools are widely used and distributed to the point their use becomes “standard practice” and a client expectation, one could reasonably expect that a competitive market might develop to provide updates, revisions, and new tools. If there were no Design Tools, designers would continue to carry out designs that require minimal hours of effort and are less efficient than could be generated using the tools. Limited evidence is provided how the market is changing. There is limited evidence to suggest that Design Tools and Practices are beginning to transform the market in a self-sustaining way.

The Design Tools and Practices program addresses three important market barriers to energy efficiency in new construction: design firm organizational practices and customs, performance uncertainties and misplaced or split incentives, but it is not clear that it does any very well. By itself, the Design Tools and Practices program can do little to effect the payment structure that

rewards A&E firms for designing buildings quickly, which generally means standard (rather than energy efficiency-optimized) designs. However, 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. Market actors who use these tools or participate in training are being surveyed to evaluate key assumptions regarding baseline attitudes and the success or failure of various elements of the Design Tools and Practices Program. The program proposes periodic evaluation to determine to what extent design tools have been adopted by the design community. In this manner, it will be possible to study (1) the extent to which the tools are used and (2) the extent to which the use of any particular tool can be linked to improvements in a designer's (and the design community's) practice with respect to energy efficiency. When third parties begin supporting and developing these and similar tools, Design Tools and Practices will have altered the market to a point where the program will no longer need PGC funds.

Balanced Portfolio Criteria

The Design Tools and Practices program contributes to a balanced portfolio by:

- transforming "upstream" designers and builders to use energy-efficiency design software in making decisions regarding building design, product design, and/or system design;
- capturing lost opportunities by targeting the design phase of the construction process; and
- maximizing and leveraging societal and in-state energy-efficiency-related benefits by targeting a large market and because many of the best energy-efficiency measures (including a "systems approach") can be most cost-effectively incorporated at the new construction or renovation design stage when design tools are most useful.

Design Tools and Practices supports many other programs to make them more effective at achieving energy savings and might be more effective if it were integrated with other program offerings. The program has cross-cutting issues as Design Tools are used for both new construction and retrofit/renovation. These cross-cutting issues should be considered in selecting the program portfolio.

Incentive, SPC, Related CPUC Activities Criteria

Not applicable.

Recommendation

The Design Tools and Practices Program provides no cost-effectiveness information. The market transformation plan is moderate and there is limited evidence. Therefore, the program is recommended pending cost-effectiveness evaluation.

6.2.3. Energy Centers (existing)

Cost Effectiveness

No information is provided regarding cost effectiveness or energy savings.

Market Transformation Criteria

Energy Centers offer demonstrations, educational seminars, information, and consulting assistance concerning state-of-the-art, energy-efficient design, technology, and practice. The 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 are expected to achieve market transformation by providing technical support for many other energy-efficiency market transformation programs. The plan indicates a good understanding of the energy efficiency industry for new construction and how it is changing (e.g., the number of ESCO clients is increasing). Strong evidence is provided that Energy Centers are transforming the market for energy efficiency in new construction, but whether this will become self-sustaining is less clear (see details below).

The Energy Center program addresses several key market barriers to energy efficiency including performance uncertainties, information or search costs, asymmetric information or opportunism, and bounded rationality. In a recent market effects study, TecMRKT Works[67] found that the PG&E Energy Center (PEC) is transforming markets. Specifically, the report found that the PEC 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. The sustainability of the market effect was not specifically addressed, but growing numbers of participants in Energy Center activities could indicate growth in the competitive market for energy efficient designs and information on energy efficiency. Underlying assumptions may be tested by surveying building owners/operators and energy professionals to determine the changes in their decisions and practices as a result of Energy Center training and information. Conditions for altering or withdrawing the program will depend upon the degree to which Energy Efficiency Center activities are being provided or funded by other market actors.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- promoting a vibrant energy-efficiency services industry that can be self-sustaining without a continuing need for PGC-funded programs by providing workshops, training, and demonstrations to designers, architects, engineers, builders, and contractors;
- encouraging direct interaction and negotiation among designers, architects, engineers, builders, contractors and customers, building lasting relationships that will extend into the future;
- educating designers, architects, engineers, builders, and contractors about the full range of energy-efficiency opportunities that would not otherwise be provided by the competitive market; and

[67] TecMRKT. PG&E Energy Center Market Effects Study, Arlington, VA. 1998.

- empowering customers, especially residential and small commercial customers, with meaningful information on the costs and benefits of energy-efficiency measures for new construction.

The Energy Centers support many other programs within the new construction administrator area. The Energy Efficiency Centers, discussed under the nonresidential administrator, provide similar services in a different geographic region. These programs should be coordinated across all three administrator areas. These cross-cutting issues should be considered in selecting the program portfolio.

Incentive, SPC, Related CPUC Activities Criteria

Not applicable.

Recommendation

The Energy Centers Program provides no cost-effectiveness information. The program has a moderate market transformation plan with strong evidence. Therefore, this program is recommended pending cost effectiveness evaluation.

6.2.4. Title 24 Enforcement Education Program (3rd-party and out-of-state)

Cost Effectiveness

Estimates of cost effectiveness or energy savings are not available.

Market Transformation Criteria

The market transformation objective of the Title 24 Enforcement Education Program is to increase compliance with state energy standards in rural areas by building the local capacity of building inspectors. The training program itself is well conceived and demonstrates an understanding of current code enforcement in rural areas (inadequate) and suggests that it will not improve without intervention. The market transformation plan does not address how the program will make the transition to private sector or non-PCG state funding. Providing the training is unlikely to be profitable for third parties without subsidization. The Title 24 Enforcement Education program was introduced in 1998 so no evidence of market effects is available for this program. However, 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 addresses the key market barrier of organizational practices and custom, but does not provide a clear method for assessing when this barrier has been reduced to the point where the program could be modified or withdrawn. The underlying assumption of the need for such a program has been tested via a 1997 needs assessment at California Building Officials Education Week seminars. 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.

Balanced Portfolio Criteria

The Title 24 Enforcement Education Program contributes to a balanced portfolio only by supporting activities that would not otherwise be provided by the competitive market, thereby capturing lost opportunities in new construction. The program supports other programs and could benefit from coordination with the Standards and Protocols Program and the Residential Design Assistance Program within the new construction administrator area.

Incentive, SPC, Related CPUC Activities Criteria

Incentive and SPC criteria are not applicable. The Title 24 Enforcement Education Program facilitates coordination with local, state, and federal energy-efficiency laws and standards.

Recommendation

The Title 24 Enforcement Education program provides an important service to the traditionally under-served rural market and has the potential to enhance realization of energy efficiency opportunities in new construction. No cost effectiveness information is available. The program has a moderate market transformation plan with limited evidence. Therefore, this program is recommended pending demonstration of cost effectiveness.

6.2.5. Standards and Protocols Program (new PY98, 3rd-party, and out-of-state)

Cost Effectiveness

No information is provided regarding cost effectiveness. 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 highly cost-effective.

Market Transformation Criteria

The Standards and Protocols 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 building design community. The market transformation plan starts with developing design guidelines to assist the design community in exceeding minimum energy-efficiency requirements. The program is then expected to institutionalize these guidelines by working with state and federal officials to turn them into standards/codes with broad geographic impact. Once the standards take effect, utility support can be withdrawn, and the market effects will continue or new standards can be proposed and the cycle repeated. This regulatory-based effort is aimed at a large proportion of the building industry which uses a cost strategy to compete in the marketplace. Targeted technologies include boilers, condensing boilers, water heaters, double-effect absorption chillers, R-19 ceiling insulation, and flue heat retrievers. The program also addresses changing the basis of Title 24 from “Source Energy Values” to “Seasonally and Time Differentiated Source Energy Values”. Widespread adoption of new technologies would occur more slowly in the absence of the Standards and Protocols Program. This “push-pull” strategy for setting new energy standards has been effective at transforming markets in the past. The EPAct of 1992, ASHRAE Std. 90.1, and Title 24 are all based on technologies that were incented and are now required.

The Standards and Protocols Program addresses the key organizational practices market barrier for targeted technologies but not the standard-setting process itself. Once a technology or practice is widely accepted in the design community and then codified, it will be implemented and energy savings will result. However, it seems unlikely that a private sector third party will completely take over the practice of pushing for new, more efficient standards. The program can be withdrawn when initially targeted practices and technologies are codified or continued indefinitely with new technologies.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- promoting a vibrant energy-efficient boiler, water heater, double-effect absorption chillers, insulation, and flue heat retriever industries that can be self-sustaining without a continuing need for PGC-funded programs by pushing for standards and protocols that require such products used in the state;
- targeting designers and builders so that energy-efficient products and services are made available, promoted, and advertised by private market participants;
- supporting activities that would not otherwise be provided by the competitive market by pushing for new standards and protocols to capture lost opportunities in new construction;
- transforming markets in an expeditious manner by pushing for swift codification of targeted technologies and practices; and
- maximizing and leveraging societal and in-state energy-efficiency-related benefits achievable through PGC funding by making targeted technologies and practices a legal requirement throughout the state (in contrast, efficiency efforts that target market leaders only impact a small fraction of the market).

The Standards and Protocols program provides support to many other programs within the new construction administrator area. Because Title 24 and other building energy codes apply to certain kinds of building retrofit projects, the program has cross-cutting issues that should be considered in selecting the program portfolio.

Incentive, SPC, Related CPUC Activities Criteria

Incentive and SPC criteria are not applicable. The Standards and Protocols Program contributes to Related CPUC Activities by facilitating coordination with local, state, and federal energy efficiency laws and standards.

Recommendation

The Standards and Protocols Program provides no cost-effectiveness information, but the program is expected to be cost-effective. The program has a strong plan for transforming the market for targeted technologies (i.e., once a technology is required by code, the market is essentially transformed) and limited evidence. Though organizations, such as ASHRAE are involved in development of new building codes, this program may require some continued PGC funding to assist in aggressive development of new standards. The Standards and Protocols Program contributes to related CPUC activities. Therefore, we recommend this program concept.

6.2.6. Residential Marketing/Incentives Program (existing)

Cost Effectiveness

Cost-effectiveness information is only available for the PG&E Comfort Home, which has a TRC of 1.07 based on prior M&E studies. Therefore, the program is moderately cost-effective with strong evidence. Program redesign might be necessary to improve cost-effectiveness.

Market Transformation Criteria

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 relies on building consumer awareness of the long-term benefits of energy-efficient homes, encouraging builders to use energy efficiency branding to differentiate their homes on the market, and promoting the use of Home Energy Ratings (HERs) and Energy Efficiency Mortgages (EEMs). Eventually, it is hoped that production home-buyers will recognize the value of energy efficiency and be willing to pay more for homes with these features or trade other features for added energy efficiency and access to EEM financing. On the supply side, it is hoped that production home-builders will come to recognize the added marketing value and profitability of energy-efficient homes. The plan demonstrates a good understanding of the market for new production homes, but does not provide information regarding how this market is changing or might be expected to change in the absence of the program.

The program addresses several key market actors and key market barriers, including organizational practices or customs, information or search costs, access to or understanding of financing, misplaced or split incentives, and product unavailability. No information is provided regarding how important underlying assumptions can be tested or evaluated, but formal market effects studies[68] of several utility programs comprising the Residential Marketing/Incentives Program have revealed limited evidence that they are transforming the market for energy-efficient production homes in a self-sustaining way. The most significant and notable permanent effects attributed to the programs pertained to promotion of duct sealing practices (see Program Summary for details). Future effects of the Residential Marketing/Incentives program could be indicated 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). Utility involvement over time is expected to be greatly reduced as the industry learns (as indicated by the metrics above) to use the benefits from energy efficiency as a sales advantage.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

[68] Barakat and Chamberlin. *Residential New Construction: Market Transformation Study*. 1997. RER. *Residential Market Effects Study*. San Diego, CA. June, 1998.

- targeting production home builders so that energy-efficient home features are made available, promoted, and advertised;
- empowering residential customers with meaningful information on the costs and benefits of energy-efficiency measures in new homes; and
- maximizing and leveraging societal and in-state energy-efficiency-related benefits achievable through PGC funding by targeting a large and growing market segment and working in concert with federal and state energy efficiency activities.

This incentive program (or elements thereof) could be integrated[69] with Residential Design Assistance, the Standards and Protocols Program, or the Integrated Residential Guaranteed Bill Program within the new construction administrator area.

Incentive, SPC, Related CPUC Activities Criteria

Results of the Participant Test are not available, but the Residential Marketing/Incentives Program is assumed to promote measures that are cost-effective from the participant's point of view. The program facilitates coordination with several related CPUC activities, including:

- state energy efficiency laws and standards by using Title 24 as a baseline for performance;
- federal energy efficiency programs by working with EPA's Energy Star New Homes to establish complimentary performance requirements; and
- regional energy efficiency programs by promoting use of CHEERS and other Home Energy Rating Systems (HERs).

Recommendation

The Residential Marketing/Incentives Program is moderately cost-effective with strong evidence. The program has a moderate market transformation plan with limited evidence. The program contributes to related CPUC activities. It is assumed to meet the Incentive criteria. Therefore, this program is recommended.

6.2.7. Nonresidential Incentives/Marketing Program (existing)

Cost Effectiveness

TRC tests were available for both programs within the Nonresidential Incentives/Marketing (NIM) Program group and were based on prior measurement and evaluation studies. 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. Therefore, the program is strongly cost-effective with strong evidence.

Market Transformation Criteria

The 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 equipment. The market transformation plan is to impact the

[69] Integration is defined as programs (or program elements) that are formally linked by design and implementation.

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 in energy-efficient design. The program is undertaken with the hope that in the long run, these practices will become better known and more widely accepted in the design/build community, making the market effects sustainable. Currently, nearly every major stakeholder in the San Diego development market is participating in the program, indicating a high level of change in that area. Limited evidence (discussed below) is provided to show that the program is transforming the nonresidential new construction market.

The NIM Program addresses several key barriers to energy efficiency in the nonresidential new construction market including organizational practices and customs, information costs, hassle costs, bounded rationality, access to funding, and split incentives. No formal market effects study results are available, but SDG&E reports in its second quarter filing that architects and engineers are seeking out assistance on an increasing numbers of projects, marketing representatives are making more presentations to building owners, and opportunities for educating building owners and developers considering new buildings are expanding. If the program does indeed become self-sustaining (i.e., if market pressures begin to induce designers to incorporate energy efficiency without incentives), then the program can be discontinued. The program should be reassessed annually. It relies on the assumption that technical assistance is not currently available or is too expensive for architects and engineers to hire or provide themselves. This assumption can be tested or evaluated through surveying architects, engineers and builders.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- targeting architects, engineers, and builders so that energy-efficient building features are made available, promoted, and advertised;
- capturing lost opportunities in new construction that would not otherwise be provided by the competitive market;
- empowering nonresidential customers with meaningful information on the costs and benefits of energy-efficiency measures in new buildings; and
- maximizing and leveraging societal and in-state energy-efficiency-related benefits achievable through PGC funding by targeting a large and growing market segment and working in concert with federal and state energy efficiency activities.

The NIM Program is contained within the new construction administrator area. Note that the Nonresidential SPC program does not currently address new construction and so does not provide a similar incentive-based service to this market segment.

Incentive, SPC, Related CPUC Activities Criteria

No specific information is available about the whether the program incentives pass the Participant Test although it is generally accepted that the incentives are applied to projects that are cost effective from the participants perspective with or without the incentive. SPC and Related CPUC Activities criteria are not applicable.

Recommendation

The NIM Program is strongly cost effective with strong evidence. The program has a moderate market transformation plan with limited evidence. The program is assumed to meet the Incentive criteria. Therefore, we recommend this program concept.

6.2.8. Residential Design Assistance (new PY98)

Cost Effectiveness

No information is provided regarding cost effectiveness or energy savings.

Market Transformation Criteria

The Residential Design Assistance (RDA) Program offers free design reviews either before or shortly after design drawings have been completed. The market transformation plan proposes to fill a gap in services (i.e., consideration of energy-efficient options) offered by design professionals for current projects. Eventually, architects are expected to specify energy efficient equipment and 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. The program plan does not provide an indication of how the residential design market is changing or would change in the absence of the program. No formal studies of market indicators are available to judge program performance. Program planners indicate difficulty in convincing designers and builders of the value of exceeding state energy codes. Program success seems to be hindered greatly by a failure to address split incentives (i.e., first costs are borne by developers but the energy saving benefits are accrued by future homeowners).

The Residential Design Assistance Program addresses several market barriers including information or search costs, hassle or transaction costs, organizational practices or customs, and performance uncertainty. The program is based upon the assumption that most home-builders are not familiar with the cost effectiveness of energy-efficient technologies, but no information is provided regarding how to test this and other underlying assumptions. SDG&E reports that design teams that have participated in the program are able to follow the project through to post-occupancy reviews, and support the practice of incorporating energy efficiency technologies into their project plans.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- transforming the “upstream” residential construction market (architects and builders) so that energy-efficient products and services are made available, promoted, and advertised by private market participants;
- supporting activities that would not otherwise be provided by the competitive market by capturing lost opportunities in residential new construction; and
- empowering residential customers with meaningful information on the costs and benefits of energy-efficiency measures in new homes.

The Residential Design Assistance Program supports other programs and is contained within the new construction administrator area.

Incentive, SPC, Related CPUC Activities Criteria

Not applicable.

Recommendation

The RDA program provides no cost-effectiveness information. The program has a weak market transformation plan and no evidence. Assessments from program planners indicate that the program should be redesigned to more successfully bring about market transformation. Therefore, this program does not meet the assessment criteria.

6.2.9. Nonresidential Design Assistance (existing)

Cost Effectiveness

TRC tests were available for two out of three programs within the Nonresidential Design Assistance (NDA) Program group and are based on utility projections from prior measurement and evaluation studies. Cost effectiveness as suggested by these TRC tests ranges from 1.67 (PG&E Design Assistance) to 2.93 (SoCalGas Commercial EMS). The program budget-weighted average TRC is 2.36. Therefore, the program is strongly cost-effective with strong evidence.

Market Transformation Criteria

The NDA market transformation plan seeks to 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, is expected to 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. The market transformation plan indicates an understanding of the market barriers to energy efficient design faced in the nonresidential new construction markets. Limited evidence is provided regarding how the market is changing and little or no evidence is provided to support substantial market effects.

The program addresses several key market barriers including organizational practices or customs, misplaced or split incentives, asymmetric information, information and search costs, hassle and transaction costs. No formal studies of market indicators are available to judge NDA success at reducing these barriers. Program administrators indicate that the end of many incentive programs in 1997 brought about a market perception that energy efficiency programs were no longer available. This break in continuity has resulted in low participation rates so far, although this is expected to improve. Qualitative conditions for terminating the program are proposed. It may be difficult in practice to determine at what point the market has been sufficiently transformed as to be self-sustaining.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- transforming the "upstream" nonresidential construction market (e.g., architects, engineers, and builders) so that energy-efficient products and services are made available, promoted, and advertised by private market participants;
- supporting activities that would not otherwise be provided by the competitive market by capturing lost opportunities in nonresidential new construction; and
- empowering customers with meaningful information on the costs and benefits of energy-efficiency measures in new nonresidential buildings.

NDA serves to support other program activities by building relationships with the architectural and engineering community. The program is contained within the new construction administrator area.

Incentive, SPC, Related CPUC Activities Criteria

Incentive and SPC criteria are not applicable. NDA supports local, state, and federal energy efficiency laws and standards.

Recommendation

The NDA Program is strongly cost effective with strong evidence. It has a moderate market transformation plan with limited evidence. Therefore, the program is recommended.

6.2.10. Residential/Small Commercial Demonstration Program (new PY98)

Cost Effectiveness

No information is provided regarding cost effectiveness or energy savings.

Market Transformation Criteria

The Residential/Small Commercial Demonstration Program provides funding for emerging technology installations at customer sites. Targeted technologies include geothermal and air-source heat pumps, evaporative coolers, high efficiency air conditioning, low water/energy dishwashers, furnace blower motors, and domestic water heaters. The market transformation plan indicates an understanding of the barriers faced by emerging energy-efficient technologies. 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. The program funds site tours, case studies, monitoring to document equipment performance, market assessments, feasibility studies, and training. The customer or equipment manufacturer is also sometimes provided a cash incentive to participate. Sustainability will be gauged by the ability of the technologies to stand on their own after a period of support. An assessment of the sustainability of activities performed to date is not available, but GeoExchange and the Cool Roof Rating Council are moving forward with installations and industry participation.

The program addresses several key market barriers to emerging technologies including performance uncertainties, information or search costs, hassle or transaction costs, asymmetric information or opportunism, and service or product unavailability. 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 demonstrations 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 evaluated) 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.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- promoting a vibrant industry for energy-efficient products and services in the commercial and residential market that can be self-sustaining without a continuing need for PGC-funded programs;
- encouraging direct interaction and negotiation between private market participants (emerging technology manufacturers) and customers, building lasting relationships that will extend into the future;
- transforming the “upstream” market (i.e., manufacturers) so that new energy-efficient products and services are made available, promoted, and advertised by private market participants;
- empowering residential and small commercial customers with meaningful information on the costs and benefits of new energy-efficiency measures; and
- supporting emerging technologies.

The Residential/Small Commercial Demonstration Program is a stand-alone program that overlaps all three administrator areas. These cross-cutting issues should be considered in selecting the program portfolio.

Incentive, SPC, Related CPUC Activities Criteria

Not applicable.

Recommendation

No cost-effectiveness information is provided for the Residential/Small Commercial Demonstration Program. The program has a moderate market transformation plan and limited evidence. Therefore, this program is recommended pending demonstration of cost effectiveness.

6.2.11. Commercial/Industrial/Agricultural Demonstration Program (existing)

Cost Effectiveness

No information is provided regarding cost effectiveness or energy savings.

Market Transformation Criteria

The Commercial/Industrial/Agricultural (CIA) Demonstration Program provides funding for emerging technology installations at 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 customers with the real-world experience needed to be confident that a new technology both works and offers the proposed performance. This approach will reduce the difficulty of introducing new technologies into the marketplace by helping overcome "business-as-usual" design and specification practices that continue the use of outdated technologies. Once customers see the advantages of new technologies, procedures, or designs, they will more likely to adopt them as standard practice for their organizations. Limited evidence is provided regarding how the CIA Demonstration Program will transform the market for energy efficiency in a self-sustaining way or how the market is changing. Because the program focuses on emerging technologies, sustainability may need to be evaluated for particular technologies, rather than for the program as a whole.

The CIA demonstration program addresses several key market barriers to energy efficiency including performance uncertainties, information/search costs, hassle/transaction costs, asymmetric information/opportunism, and service or product unavailability. While demonstration approaches have been effective in the past, no market assessments are available for these programs to help judge market effects or test program assumptions. SoCalGas reports that their program's focus on distributors (for promotion of horizontal-axis washers in particular) appears to be successful and is a promising approach for future efforts. Program impacts can be assessed by the penetration of the selected technologies in the marketplace and by surveys of participating and non-participating customers and contractors.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- promoting a vibrant industry for targeted energy-efficient products and services in the commercial, industrial and agricultural market sectors that can be self-sustaining without a continuing need for PGC-funded programs;
- encouraging direct interaction and negotiation between private market participants (manufacturers of new technologies) and customers, building lasting relationships that will extend into the future;
- transforming the "upstream" market (i.e., manufacturers) so that energy-efficient products in the commercial, industrial and agricultural sectors are made available, promoted, and advertised by private market participants;
- empowering customers with meaningful information on the costs and benefits of new energy-efficiency measures for commercial, industrial, and agricultural applications; and
- supporting emerging technologies.

This stand-alone program overlaps the new construction and nonresidential administrator areas. These cross-cutting issues should be considered in selecting the program portfolio.

Incentive, SPC, Related CPUC Activities Criteria

Not applicable.

Recommendation

The CIA Demonstration Program provides no cost-effectiveness information. The program has moderate market transformation plan with limited evidence that it is having a positive impact on

the new construction market. Therefore, this program is recommended, pending cost effectiveness evaluation.

6.2.12. Premium Efficiency Relocatable Classrooms Demonstration (new PY98)

Cost Effectiveness

The PERC Program provides no cost-effectiveness information. 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 Transformation Criteria

The PERC Program 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. The program will promote efficient HVAC and lighting equipment. Since the field of manufacturers is relatively small, it is anticipated that other manufacturers will adopt the PERC concept if the demonstration is successful. While this market is not one of the bigger loads in California, the program has the potential to achieve 100% market penetration.

By working through the design issues with manufacturers, doing demonstrations, and helping to market the product, this effort will overcome uncertainty over new technologies, organizational practices or customs, and service or product unavailability. In the absence of the program, this activity would not occur. PG&E reports that as technical discussions have proceeded, manufacturers have become more comfortable with the energy efficiency measures that make up PERCs. 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. If a few manufacturers adopt this technology and others follow, the market will then be transformed and the program can be withdrawn, unless new cost-effective technologies emerge that warrant the same approach in this market sector.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- promoting a vibrant energy-efficient relocatable classroom industry that can be self-sustaining without a continuing need for PGC-funded programs;
- encouraging direct interaction and negotiation between private market participants (classroom manufacturers) and customers;
- transforming the “upstream” market (manufacturers) so that energy-efficient relocatable classrooms are made available, promoted, and advertised by private market participants;
- capturing lost opportunities in a segment of the new construction market;
- having the potential to transform the entire market for relocatable classrooms over a three to five year timeframe; and
- stimulating potentially cost-effective emerging technologies.

The PERC Demonstration is a stand-alone program contained within the new construction administrator area.

Incentive, SPC, Related CPUC Activities Criteria

Not applicable.

Recommendation

The PERC Program provides no cost-effectiveness information. However, strong evidence is provided to indicate cost effectiveness. The Premium Efficiency Relocatable Classrooms (PERC) Demonstration Program has the potential to achieve high market penetration within a short time and with a limited budget. The program has a strong market transformation plan with limited evidence. Therefore, the program is recommended.

6.2.13. Developing Green Communities (new PY98 and 3rd-party)

Cost Effectiveness

TRC tests were provided for 1 out of 3 programs within the Developing Green Communities (DGC) Program group. Strong cost effectiveness is indicated by a TRC test of 2.06 and strong evidence for cost effectiveness was provided by the 3rd party bidder as part of their program application.

Market Transformation Criteria

The DGC Program market transformation plan is based on the premise that local governments can attack 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. The program relies upon the assumption that developers are willing to work with city and county planning departments to implement energy efficiency improvements in exchange for project approval. In this way the program can identify projects and intervene early in the planning process. The market transformation plan indicates a good understanding of the market actors involved in the development process. The program plan suggests that sustainable market change may occur through the influence of developers on future projects in non-participating cities and through the adoption of program practices by non-participating cities. No current evidence of sustainability is presented.

The Developing Green Communities program addresses several key market barriers to energy efficiency in the new construction market including organizational practices, information/search costs, service or product unavailability, and misplaced or split incentives. Although the program has only recently begun, 29 cities in the state have already agreed to participate in the program. So far energy efficiency alternatives have been evaluated for subdivisions totaling 1,200 homes. No indication is provided in the program plan as to how or when the program will be altered or withdrawn. A market effects study is being conducted as part of the program. Interviews with city planners and developers are being conducted to assess their interest.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- supporting the development of efficient new construction that would not otherwise be provided by the competitive market by capturing opportunities that are usually lost because of split incentives;
- transforming markets in an expeditious manner, in view of the limited time horizon over which PGC funding is guaranteed; and
- leveraging societal and in-state energy-efficiency-related benefits achievable through PGC funding through community level planning decisions. For example, strategies such as reducing heat islands by narrowing streets, street tree planting, and planting trees in parking lots, happen at the community level and cannot be instigated and implemented effectively by the private sector.

The Developing Green Communities program could function as a stand-alone program or be integrated with other programs. The program is fully contained within the new construction administrator area.

Incentive, SPC, Related CPUC Activities Criteria

This program supports local and regional energy efficiency programs.

Recommendation

The DGC Program has strong cost-effectiveness and strong evidence. The program has a moderate market transformation plan with limited evidence as to the market effects of the program. Therefore, the program is recommended.

6.2.14. New Construction Nonresidential Standard Performance Contract[70] (new concept)

Cost Effectiveness

The New Construction Nonresidential Standard Performance Contract (NCNSPC) Program provides no benefit-cost ratio information, but the program is expected to be cost effective based on the large potential for savings in the commercial new construction market and strong supporting calculations for savings estimates that were provided. The California Energy Commission (CEC) estimates savings of 120-300 GWh and 4-10 million therms per year if all new buildings used performance contracting.

Market Transformation Criteria

The NCNSPC Program provides incentives to building owners and designers to produce buildings that significantly exceed Title 24. Designers are generally paid a flat percentage of building construction costs, which discourages innovative designs that require additional effort. The market transformation plan is to pay the design team a “royalty” equivalent to a portion of the

[70] Program concept submitted by the California Energy Commission.

energy savings. Use of measurement and evaluation (M&V) protocols will provide a basis for determining the royalty and demonstrating the benefits to the owner. By providing a new construction standard performance contract, the program will avoid the need for designers and owners to negotiate their own contracts.

The NCNSPC Program addresses several market barriers to energy efficiency in the new construction market including organizational practices and performance uncertainties, information/search costs, service or product unavailability, and misplaced or split incentives. Performance contracting is taking hold for retrofit projects, but so far the City of Oakland is the only standard performance contracting project for new construction in the state. Without the program, SPC for new construction would probably not develop. The underlying assumption for the program design is that designers and builder owners/operators will value the process and participate. This can be demonstrated by the design community and building owners/operators attending informational meetings and then signing up their projects for the program. Two indicators would show when PGC funding is no longer needed: 1) when building owners/operators understand building life cycle costs and are willing to pay designers for more efficient designs (as opposed to a fixed percentage); and 2) when designers successfully market their energy efficiency expertise as a factor that differentiates them from the competition.

Balanced Portfolio Criteria

This program contributes to a balanced portfolio by:

- promoting a new construction energy efficient design practices area of expertise that can be self-sustaining without a continuing need for PGC-funded programs;
- encouraging direct interaction and negotiation between designers with expertise in energy efficiency and building owners, thereby building lasting relationships that will extend into the future;
- transforming the “upstream” market (e.g., architects and builders) so that energy-efficient new buildings are made available, promoted, and advertised by private market participants;
- capturing lost opportunities in the commercial new construction market; and
- potentially transforming the market for energy efficiency in nonresidential new construction in an expeditious manner as the market copies the success of early adopters.

The NCNSPC is contained within the new construction administrator area.

Incentive, SPC, Related CPUC Activities Criteria

No specific information is available about the whether the program measures pass the Participant Test. The program design is in the conceptual stage, so details have not been worked out. However, the program could satisfy all of the SPC program criteria laid out in Rule IV-7. The program supports local, state, and federal market transformation activities and energy efficiency laws and standards.

Recommendation

The NCNSPC Program provides no benefit-cost ratio information. However, strong evidence of cost effectiveness was provided. The program has a strong market transformation plan with limited evidence. Therefore, the program is recommended.

6.2.15. Integrated Systems Residential New Construction Program[71] (new concept)

Cost Effectiveness

No benefit-cost ratio information is provided, but strong evidence for cost effectiveness is shown by supporting calculations for savings estimates. The CEC estimates first year energy savings at approximately 4,300,000 kWh and 179,000 therms.

Market Transformation Criteria

The Integrated Systems Residential New Construction Program will help participating builders 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, and durability of super-efficient houses. Model homes will be built and the incremental cost difference between standard construction practice and program protocols will be paid with program funds. Participating builders will offer guaranteed maximum energy bills to homebuyers as an indicator of greater efficiency and comfort. Builders are expected to be motivated 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. The market transformation plan aims to develop consumer demand for guaranteed energy performance (market pull) and builder support for guaranteed energy performance (market push). The program plan indicates that a few companies in California and nationwide are offering performance guarantees as a means of marketing new homes, but that this tactic needs more intensive promotion in California to ignite interest in the approach and increase market effect. The program plan provides an outline as to how it might enact sustainable market change.

The program addresses several key market barriers to energy efficiency including information costs and uncertainty for homebuyers; industry organizational practices and performance uncertainties; split incentives of builders with respect to efficiency investment; and unavailability of high efficiency equipment and materials. Because this is a new program concept there are no indicators by which to judge program success. It is proposed that 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. There are three key assumptions that need to be addressed by the program; 1) that 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 that 3) 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. The program plan proposes market research activities that will address these assumptions.

Balanced Portfolio Criteria

This program concept has the potential to contribute to a balanced portfolio by:

[71] Program concept submitted by the California Energy Commission.

- promoting a vibrant residential energy-efficiency products and services industry that can be self-sustaining without a continuing need for PGC-funded programs;
- encouraging direct interaction and negotiation between homeowners, builders and energy-efficiency service providers, building lasting relationships that will extend into the future;
- transforming the "upstream" residential construction market so that energy-efficient products and services are made available, promoted, and advertised by builders; and
- empowering residential customers with meaningful information on the costs and benefits of energy-efficiency measures.

This incentive program is contained within the new construction administrator area.

Incentive, SPC, Related CPUC Activities Criteria

No information is available to evaluate the incentive portion of this program. SPC and Related CPUC Activities criteria are not applicable.

Recommendation

No benefit-cost ratio information is provided for the Integrated Systems Residential New Construction Program, but strong evidence for cost effectiveness is shown. The program has a strong market transformation plan with limited evidence. Therefore, the program is recommended.

Appendix A: Memorandums to the CBEE Regarding Program Clarification and Design Recommendations

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MEMORANDUM

Date: September 29, 1998
To: California Board for Energy Efficiency
From: Robert Mowris and Associates
Re: Residential Energy Efficiency Mortgages and Loans Program

The memo provides clarification and design recommendations for the Residential Energy Efficiency Mortgages and Loans Program (previous titled Residential Financing Program). The Residential Energy Efficiency Mortgages and Loans Program is comprised of three programs offered in California in 1998:

- Comfort Link (PG&E, new for 98);
- Residential Financing Program (SCE, new for 98); and
- Energy-Aware Housing Agents Program (PG&E-administered Third-Party program).

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.

Loans

Below market rate loans are 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 California energy-efficiency standards by a pre-determined amount or percentage.

Energy Efficiency Mortgages (EEMs)

The Energy-Aware Housing Agents Program (EAHAP) is the only program under the Residential Energy Efficiency Mortgages and Loans "umbrella" program that provides energy efficiency mortgages to homeowners. A full description of that program follows below.

A summary of each of the three programs, activities, and budgets are given below.

Comfort Link (PG&E, new in 1998)

PG&E's Comfort Link program is designed to increase the availability of low-interest loans to single family and multi-family property owners who want to install energy efficiency measures. The program includes an information campaign to educate consumers on the benefits of energy-efficient technologies, introduces consumers to lenders that provide various financing opportunities, and educates contractors about energy-efficient equipment and proper installation practices. The program links customers and lenders through educational efforts. There is no financial recourse to PG&E (to reduce lender risk) and PG&E is not buying down the interest

rate. PG&E's marketing efforts will lead to referrals and the lenders will therefore provide loans at lower than market rate for individuals seeking unsecured loans.

Program activities in 1998 have been very limited. As of July, PG&E had completed evaluation of options with previous loan services (VIEWTECH) and lender (Fannie Mae). The 1998 budget for the program is $1 million.

SCE Residential Financing

SCE's Residential Financing Program will offer affordable loans to qualified homeowners who make energy efficiency improvements to existing homes. The program focuses on upgrades to insulation, central air conditioning and duct repair, central heat pumps, and energy efficient windows. Customers can receive financing from $1,000 to $15,000 for qualifying projects. SCE is funding the set-up costs of the lender's new operation and will provide initial subsidies to buy down loan interest rates.

Program activities in 1998 have been very limited. A contract was recently signed with a vendor who will administer the program. The total budget for the program is $ 1.5 million.

Energy-Aware Housing Agents Program (3rd Party Program)

EAHAP differs from the other two programs grouped within the residential financing "umbrella" in that it offers energy efficiency 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) offering financing products and; 2) 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 homebuyers.

So far, the program has been deployed in Fresno, San Francisco and Sacramento. Several hundred energy efficiency mortgages have already been issued, and first year program goals are being met ahead of schedule. Thirteen training classes have been held for housing agents, with a total of attendance of 208 housing agents. The 1998 budget for the program is $0.5 million.

Conclusion

The three programs included under the "umbrella" program concept of Residential Energy Efficiency Mortgages and Loans Program each seek to improve the market penetration of energy efficient technologies in the residential retrofit market. They do this through different means and

target different sub-sectors of the residential market. PG&E's Comfort Link program and SCE's Residential Financing Program offer low cost loans to a broad market. The Energy Awareness Housing Agents Program targets first-time and low-income home buyers and offers energy efficiency mortgages rather than smaller, home improvement loans. The EAHAP strategy is unique in that it attempts to intervene at a critical juncture, the home purchase, when home owners may be more willing to make improvements and the incremental monthly payment for investing in energy efficiency is small.

Design Recommendations

Future programs will benefit from the inclusion of multiple financing options, including loans and mortgages. The energy efficiency mortgage concept should be expanded to the entire existing home sales market, rather than only first-time and low-income home buyers.

MEMORANDUM

Date: September 29, 1998
To: California Board for Energy Efficiency
From: Robert Mowris and Associates
Re: Residential Information and Education and Residential Audits and Surveys Programs

The memo provides design recommendations for the Residential Information and Education Program and the Residential Audits and Surveys Program. Historically, these programs have had large budgets. The information programs have reached virtually all customers and the audits and surveys programs have reached a large number of customers. However, energy savings associated with these programs have been less than the rebate programs. The following recommendations are intended to improve the cost-effectiveness of the programs. Suggestions from XENERGY (current providers of direct-mail surveys to residential customers in most of California) are included in this memo.

Residential Information and Education Program

The Residential Information and Education Program's (RIEP) objective is to educate a significant portion of residential customers about the added value of energy-efficient products, practices, and services. Information is **not** specific to individual homes, but is intended to increase general awareness and understanding of energy efficiency in the residential sector. Thus customers are more inclined to participate in other PGC-funded programs and take actions on their own. Information is provided through telephone hotline call centers, printed materials, displays, participation in community events and trade shows, radio ads, bill inserts, and Websites.

Design Recommendations

While the RIEP supports several of the balanced portfolio goals and other educational activities of the CPUC, we believe the program effectiveness could be improved if it were redesigned to increase its integration with other program offerings.

We have four recommendations for improving the existing Residential Information and Education Program.

1. **Connecting customers with vendors.** Several utilities are already starting to make more explicit attempts to bring customers and vendors together. SoCalGas has a contractor referral network and SCE's saving@home Website is slated to have dealer referrals. PG&E's SmarterEnergy is an Internet service that provides customers with a searchable vendor database in addition to energy-efficient equipment purchasing guides and tips for selecting a good contractor.
2. **Referring customers to other programs,** such as appliance rebates. Many utility information programs already do this informally, but might be more effective if there were better coordination between "educational" and "marketing" efforts.
3. **Broad outreach through newsletters and the Internet.** Funding for energy-efficiency content in bill insert newsletters could be provided to all electricity providers that bill customers directly.

4. **Greater emphasis on educating customers about life-cycle costs versus first costs.** The life-cycle cost concept is key to creating lasting changes in consumer purchasing decisions.

In addition, PGC funds could be used to create a new educational program targeting existing home sales and remodeling.

Existing Home Sales

Approximately 550,000 existing homes were sold in California in 1997,[72] and 75 percent of those homes had a home inspection initiated by the buyer.[73] Home inspection reports typically include information about insulation, windows, and age and condition of the furnace, air conditioner, and water heater. If other energy audit elements were added to existing inspection checklists or software, the incremental cost to perform the audit would be small. Sellers will be motivated to release their billing data to help sell their home. Since the buyer is obtaining financing to purchase the home, and might also be interested in purchasing appliances (or remodeling), this is an opportune time to consider energy-efficiency upgrades. Other residential energy-efficiency programs could be promoted through this market event such as surveys and audits, energy efficiency mortgages, downstream incentives, RSPC, and alliances/branding/labeling.

Remodeling

Remodeling is a key market event when many decisions that impact energy use are made. Appliances and lighting are replaced and shell measures, such as windows and insulation, are installed or replaced. The program would work with large home improvement chains (e.g., Home Depot or Orchard Supply Hardware) to set up energy-efficiency showrooms. A small area in the store would be set aside to display sample energy-efficiency products from all end uses. Limited product samples would be available in the showroom and signs would refer the customer or contractor to the area of the store with the more comprehensive selection. A display could be set up with energy-efficient equipment fact sheets and a computer linked to the residential energy-efficiency Website. The program would provide training to store employees, offer help to identify products to stock, potentially co-fund the display or rent the store space (since floor space is valuable), and promote the energy-efficiency showrooms.

Audits and Surveys Program

The Audits and Surveys Program (ASP) provides direct mail, telephone, and web-based surveys and on-site home energy audits to increase customer awareness of energy-efficiency opportunities and encourage them to adopt specific measures. Information provided to customers through this program is tailored to the individual home.

To clarify our discussion, we will adopt the following nomenclature: A **survey** solicits information from a customer about his or her home, appliances, and usage patterns. This data is combined with billing records to produce a customized report that suggests opportunities for energy-

[72] Existing home sales in 1997 were 555,380, State of California Department of Real Estate Statistics.

[73] Personal communication with California Real Estate Inspection Association, Scott Clements, Inspectech Corporation, 2527 Camino Ramon, Suite 375, San Ramon, CA 94583.

efficiency improvement recommendations. An **audit** consists of an on-site visit by a trained auditor who provides energy-efficiency improvement recommendations.

Design Recommendations

We have five recommendations for modifying the existing ASP to improve its market transformation potential.

1. **Target customers during key market events such as existing home sales and remodeling**. Decisions regarding energy efficiency are likely to be influenced by audits or surveys during these two market events. Customers can be reached through alliances with real estate agencies, home inspection companies, mortgage brokers, and city inspection departments and advertising at home improvement centers and lumberyards.
2. **Target homeowners who are likely to do something as a consequence of getting audit or survey results**. These homeowners can be identified from customer[74] and membership[75] databases or any number of other demographic characteristics, such as zip code. Census data and past participation in programs can also be used for targeting. One implementation option is to create an on-going monthly or quarterly "energy-efficiency service" that is initiated with a comprehensive, yet low cost direct mail, Internet, or phone survey. Membership fees would support a mail-in survey program and entitle participants to discounts on energy-efficient equipment through the organization or mail order companies.
3. **Be more explicit about providing customers with purchasing information and referrals to vendors and other programs.** As with the general informational programs, some utilities are already trying to make these connections more explicit. For example, auditors in PG&E's Multi-Family Properties Energy Management Services (EMS) look for facilities that match the specifications of the Residential SPC Program and provide information about the program to the relevant customers. Linking customers with vendors is discussed above in the section on Residential Information and Education Programs.
4. **Combine audits with direct installation of energy-efficiency measures.** Combining audits or surveys with the RSPC Program is discussed in the RSPC Program memo. Integrating audits or surveys with other programs is critical to self-sustaining market transformation objectives. This approach also reduces marketing and administrative costs and guarantees energy benefits from each audit or survey.
5. **Transition to one-time fee or paid subscription service (as noted above).** According to XENERGY, average total costs for direct-mail energy survey reports range from $10-15 for a broad ranging program similar to the volume currently provided across the California utility service areas. XENERGY worked with a confidential client outside of California in a

[74] Consumer databases can be purchased from many sources such as Axicom/Dataquick, Working Assets, and others.

[75] Membership databases can be purchased from organizations such as Sierra Club, Audubon Society, World Wildlife Fund, NRDC, Earth Island Network, American Association of Retired People, etc.

controlled pilot program study to test customers' willingness to pay for a mail-in energy survey service. Results are shown in the following table.[76]

Offer	Customer Response
Free Service	34.4%
$10 Fee	13.5%
$25 Fee	8.2%

We offer four new ideas for delivering the Audits and Survey Program.

1. **Use PGC funding to add energy audit elements to existing pre-sale home inspections.** As mentioned above, approximately 75 percent of existing-home buyers commission a general home inspection that already includes information about insulation, windows, and age and condition of the furnace, air conditioner, and water heater. If other energy-audit elements were added to existing inspection checklists or software, the incremental cost to perform the audit would be small. This approach also has the advantage of targeting an existing private sector service and the key market events discussed above. Other residential energy-efficiency programs could be promoted through this market event.
2. **Transform on-site audits into Home Energy Rating Systems (HERs) audits.** HERs audits are more thorough than a typical utility on-site audit, but also open the door to financing opportunities through Energy Efficiency Mortgages (EEMs). One type of HERS, the California Home Energy Efficiency Rating System (CHEERS) is already available in the state and is being subsidized by PCG funds.
3. **Transition to private providers of audits and surveys.** Private providers of audits and surveys can use the service to establish branding and bundled service packages. They could sell this information to private electricity providers that might use energy-efficiency audits and surveys to promote their renewable power products. This information could also be sold to HVAC, windows, or remodeling companies to promote their products and services.
4. **Develop legislation requiring audits and minimum standards when homes are sold.** Another way to ensure long-term self-sustaining implementation of audits and surveys is to develop statewide legislation requiring audits and minimum standards (such as residential energy conservation ordinances[77]) when an existing home is sold. This existing home standard

[76] W. Tobiasson, *New Concepts for Audit Programs.* Memorandum prepared for Robert Mowris and Associates. XENERGY, Inc., Oakland, CA. September 21, 1998.

[77] San Francisco, Berkeley, and Santa Monica currently have RECOs in place requiring energy conservation upgrades when a home is sold. The San Francisco RECO requires one-time upgrades not to exceed $1,300. Required measures include: R-19 attic insulation (if existing is less than or R-11 and peak attic clearance is 18 inches or greater); R-4 insulation on first 4 ft of water heater pipe; R-6 water heater blanket with pressure relief valve; minimum R-3 duct insulation (if no asbestos); 2.5 gpm water-saving showerheads and faucet aerators; 1.6 gallon per flush toilets or toilet dam; and weatherstrip all exterior doors. Additional measures for multi-family buildings include: insulating steam and hot water circulation pipes; time clocks for boiler burners; and clean and tune boilers.

could be a one-time requirement for homes built prior to 1978.[78] The audit could be performed by private home inspectors (discussed above) or local government inspectors.

The suggestions provided above are based on our understanding of how the current information and audits/surveys programs operate and our judgment regarding what activities might be most effective at transforming the residential market for energy-efficient products and services. These suggestions should be considered along with market segment or market-effects studies.

[78] Title-24 requirements apply to homes built in 1978 or thereafter.

MEMORANDUM

Date: September 29, 1998
To: California Board for Energy Efficiency
From: Robert Mowris and Associates
Re: Residential Standard Performance Contract (RSPC) Program

This memo provides design recommendations regarding the following RSPC Program issues: 1) lottery system; 2) measures and primary market event; 3) deemed versus performance-based M&V payments; 4) M&V protocols; 5) customer value; 6) access to customer billing data; 7) single versus multiple administrators; and 8) self-sustaining market transformation.

1. **Lottery System.** Due to the expected 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.
   Design Recommendation
   The lottery system should be replaced with a selection process based on merit that considers: the quality of the application; market barriers; market events; end uses; measures and services;[79] marketing plans; customer contribution; cost-effectiveness; experience of the project sponsor; site control; and market transformation plan (i.e., sustainability). Specifications regarding quality standards for measure installation and energy savings should also be included in the selection criteria. The selection process should provide opportunities for small contractors to participate as project sponsors. Letting smaller amounts of money (e.g., $50,000 to $200,000) will allow small contractors to be involved.[80] The selection criteria should be explicit, and available to applicants.

2. **Measures and Primary Market Event.** Eligible short-life measures[81] include: compact fluorescent lamps, water-saving 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, dishwashers, horizontal-axis clothes washers), energy-efficient hardwired lighting fixtures (fluorescent, electronic ballasts, HID fixtures, LED exit signs), lighting controls (occupancy sensors, photocells, bypass/delay timers, time clocks), pool pump, and hot water pipe insulation. The primary market event targeted by the RSPC Program is retrofit or planned replacement.

[79] Customer information, education, surveys, and audits.
[80] Applications as small as $12,000 were allowed in 1998 (e.g., 20,000 therms times an incentive of $0.60 per therm).
[81] Not all measures in this list were allowed by each interim utility administrator.

Design Recommendation
Water-saving showerheads and faucet aerators should be excluded from future RSPC Programs, since they are already governed by US Code,[82] and will reach full penetration without the need for PGC funds. In addition to the retrofit and planned replacement market events, the RSPC Program should target market barriers and market events associated with remodeling, emergency replacement, replace on burnout, and new equipment purchase.

3. **Deemed Payment versus Performance-Based M&V Payment.** Most of the interim utility administrators require post-installation testing and verification protocols for deemed measures to verify compliance, and make payment adjustments accordingly.[83] The 1998 performance-based M&V payment requires 12 months of post-installation billing data and time for the analyses, extending final payment by at least 12 months compared to the deemed payment. All project sponsors opted to contract for deemed payment (based on utility-prescribed energy savings, measure lifetimes, and retention study results) rather than performance-based M&V payment due to the extra time required for final payment, and the cost and risk associated with the performance-based M&V payment.
   Design Recommendation
   Installation and verification protocols should be developed for all measures to ensure proper installation, and to avoid the possibility of "kind-for-kind" replacement. The performance-based M&V payment method should be redesigned to minimize the waiting time required for final payment. Deemed savings and payments per measure should be established based on these considerations.

4. **M&V Protocols.** For the 1999 RSPC Program and beyond, project sponsors proposed having the flexibility to select International Performance Measurement and Verification Protocol[84] (IPMVP) Options A,[85] B,[86] C,[87] or D[88] depending on the particular situation. In an effort to

[82] *42 USC Sec. 6295; Title 42 – The Public Health and Welfare; Chapter 77 – Energy Conservation, Subchapter III - Improving Energy Efficiency, Part A - Energy Conservation Program for Consumer Products Other Than Automobiles*, The maximum water use allowed for any showerhead manufactured after January 1, 1994, is 2.5 gallons per minute when measured at a flowing water pressure of 80 pounds per square inch. Showerheads shall also meet the requirements of ASME/ANSI A112.18.1M-1989 (Rev. 1996), 7.4.3(a). (2) The maximum water use allowed for any of the following faucets manufactured after January 1, 1994, when measured at a flowing water pressure of 80 pounds per square inch, is as follows: Lavatory faucets 2.5 gallons per minute; Lavatory replacement aerators 2.5 gallons per minute; Kitchen faucets 2.5 gallons per minute; Kitchen replacement aerators 2.5 gallons per minute; Metering faucets 0.25 gallons per cycle.

[83] R. Mowris. *Measure Installation, Testing, and Verification Protocols* (for showerheads, duct sealing, water heater controller, attic insulation, infiltration reduction, high-efficiency water heater, and high-efficiency furnace). Prepared for Southern California Gas Company, Southern California Edison, and Pacific Gas and Electric Company. 1998.

[84] US Department of Energy. *International Performance Measurement and Verification Protocol.* Expanded Version of the 1996 North American Energy Measurement and Verification Protocol. DOE/EE-0157. December 1997.

[85] IPMVP Option A is intended for retrofits where end-use capacity, demand, or power level can be measured or stipulated with manufacturer's measurements, and energy consumption or operating hours are known in advance, stipulated, or agreed upon by both parties. Estimated energy consumption and savings are calculated under Option A by multiplying the measured end-use capacity (i.e., kW, Btu/hr, or showerhead flow in gpm) by the stipulated (or deemed) hours of operation for each characteristic mode of operation (i.e., weekday/weekend hourly profiles) and

negate the need for billing information for a control group, PG&E required a Trend Analysis M&V protocol using three years of billing data prior to treatment (similar to IPMVP Option C) to account for naturally occurring energy efficiency. SoCalGas required billing analysis using CADMAC M&V protocols (similar to IPMVP Option C). Edison required billing analysis using CADMAC M&V protocols (similar to IPMVP Option C), but offered to pay for all M&V studies. SDG&E required billing analysis (similar to IPMVP Option C).

Design Recommendation

Some measures such as duct sealing, infiltration reduction, refrigerators, pool pumps, and compact fluorescent lighting warrant an IPMVP Option A or B M&V protocol, while other measures such as attic insulation or energy-efficient windows warrant an IPMVP Option C or D M&V protocol. Pre- and post-installation measurement (consistent with IPMVP Option A) was optional in 1998, but should be mandatory for all measures in 1999.

5. **Customer Value.** Project sponsors indicated that M&V protocols should be designed to show individual customers that they are getting value for their money.

   Design Recommendation

   Future RSPC Programs should require customer contributions to acquaint customers with the value of energy efficiency. Educating customers about the value of energy-efficient products and practices might include offering energy audits and home energy ratings. Future RSPC Programs should also include quality standards for measures such as quality of insulation (including embodied energy), quality of fluorescent fixtures and other considerations.

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an appropriate constant. Option A can be used with a deemed approach to estimate greater or lesser savings than assumed in the deemed approach, or to verify performance using pre- and post-installation measurements.

[86] IPMVP Option B is intended for retrofits where end-use capacity, demand, or power level can be measured baseline, and the energy consumption of the equipment or sub-system can be measured post-installation over time. Estimated energy consumption and savings are calculated under Option B using an engineering model employing input data from a statistically representative sample of program participants. The difference between Option A and B is that Option A uses one-time baseline and post-installation "snap-shot" capacity, power measurements, or stipulated energy use, whereas Option B uses portable monitoring equipment installed in a facility for a period of time or continuously to measure the in-situ, baseline and post-installation performance.

[87] IPMVP Option C encompasses whole-facility or main-meter verification procedures that provide retrofit performance verification for the projects where whole-facility baseline and post-installation data (e.g., billing data) are available to measure savings. Estimated energy consumption and savings are calculated under Option C using engineering model employing input data from a statistically representative sample of program participants.

[88] IPMVP Option D is intended for energy conservation retrofits where calibrated simulations of the baseline energy use and/or calibrated simulations of the post-installation energy consumption are used to measure savings from the energy conservation retrofit. Option D can involve measurements of energy use both before and after the retrofit for specific equipment or energy end use as needed to calibrate the simulation program. Estimated energy consumption is calculated using calibrated hourly simulation models of whole-building energy use, or equipment sub-systems in the baseline mode and in the post-installation mode and comparing the simulated annual differences for either an average weather year or for weather and operational conditions that correspond to the specific year during either the baseline or post-installation period. The primary difference between Option D and the other options is that Option D uses calibrated simulations of either the whole building or of sub-systems in the building to determine energy savings. Note that calibrated simulations are recommended under Option B in certain situations and under Option C for chillers and boilers.

6. **Access to Customer Billing Data.** Some project sponsors want access to customer billing data for marketing purposes prior to obtaining customer consent. However, utilities refuse to release billing data without first receiving customers' permission.

   Design Recommendation

   One way to overcome this problem is to send a standard customer billing data release form to all customers in a targeted geographic area or statewide that also includes a direct-mail energy survey. Customer's who grant permission to release their billing data and complete the direct-mail energy survey would then be eligible to participate in the RSPC Program. Customer billing data could be obtained by a statewide administrator or interim utility administrators, and sold at cost to project sponsors. According to XENERGY, the estimated cost for billing data is approximately $1.50 per customer,[89] and the estimated cost for direct-mail energy surveys is $10-15 per customer.[90] Another way to overcome this problem would be to target RSPC to the existing home sale market event (see below), since sellers would be motivated to release their billing data to help sell their home.

7. **Single Versus Multiple Administrators.** Project sponsors propose having one RSPC Program administrator for 1999 and beyond, so that all programs are uniform across the state. According to the project sponsors, using a single administrator might reduce administrative costs and increase incentive budgets.

   Design Recommendation

   Future RSPC interim utility administrators should use uniform contracts, guidelines, and procedures (i.e., incentives, payment methods, M&V requirements, deemed measure savings, and protocols) in order to achieve the desired level of uniformity across service territories.

8. **Self-sustaining Market Transformation.** The RSPC market transformation plan aims to develop greater customer knowledge of energy-efficiency services, build better relationships between energy-efficiency service providers (EESPs) and customers, and create more sophisticated EESP marketing and business practices. The ultimate goal is to build a fully competitive and self-sustaining market for retailers, contractors, and EESPs to deliver energy-efficiency products and services.

   Design Recommendation

   In order to become self-sustaining, future RSPC Programs should require a customer contribution, customer education, information, surveys, and audits. Targeting RSPC to specific markets (i.e., likely adopters) and existing home sales will reduce marketing costs and add energy-efficiency considerations to the process of buying or selling a home where energy-efficiency improvements are likely to be integrated into the transaction in a self-sustaining way. Approximately 550,000 existing homes were sold in California in 1997,[91] and 75 percent of those homes had a home inspection initiated by the buyer.[92] Home inspection reports typically include information about insulation, windows, and age and condition of the furnace,

[89] Personal communication with W. Tobiasson, XENERGY, Inc., September 29, 1998.

[90] W. Tobiasson, *New Concepts for Audit Programs.* Memorandum prepared for Robert Mowris and Associates. XENERGY, Inc., Oakland, CA. September 21, 1998.

[91] Existing home sales in 1997 were 555,380, State of California Department of Real Estate Statistics.

[92] Personal communication with California Real Estate Inspection Association, Scott Clements, Inspectech Corporation, 2527 Camino Ramon, Suite 375, San Ramon, CA 94583.

air conditioner, and water heater. If other energy audit elements were added to existing inspection checklists or software, the incremental cost to perform the audit would be small. Sellers will be motivated to release their billing data to help sell their home. Since the buyer is obtaining financing to purchase the home, and might also be interested in purchasing appliances (or remodeling), this is an opportune time to consider energy-efficiency upgrades offered by the RSPC Program. Other residential energy-efficiency programs could be promoted through this market event such as energy efficiency mortgages, downstream incentives, and alliances/branding/labeling.