PY2006-2008 INDIRECT IMPACT EVALUATION OF THE STATEWIDE EDUCATION & INFORMATION PROGRAMS

FINAL: VOLUME I OF III
STUDY ID: CPU0026.01

Prepared by

Opinion Dynamics Corp.

Summit Blue Consulting

Jai J. Mitchell Analytics

For the

California Public Utilities Commission
Energy Division

March 2010

STRUCTURE OF THE REPORT

This report is divided into three volumes. The information in this volume (Volume I) provides an overview of the program, as well as findings from our indirect impact analysis. The volume's appendices include the Cognitive Change Index (CCI) methodology and the Energy Savings Analysis. Volume II presents our detailed findings by program. Volume III contains the survey instruments utilized for our analysis.

PROGRAMS EVALUATED

Under the Education and Information evaluation effort, nine programs were evaluated for indirect impacts. These programs are shown in the table below.

Utility	Program ID	Program Name
PGE	PGE2044	Builder Energy Code Training
PGE	PGE2057	Green Building Technical Support Services – Build It Green
SCE	SCE2548	Southern California Home Performance
SDGE	SDGE3036	Time of Sale Energy Efficiency Check Up
SDGE	SDGE3040	Business Energy Assessment
SDGE	SDGE3032	K-12 Energy Efficiency Education
SCG	SCG3531	PACE Energy Efficient Ethnic Outreach
SCG & SCE	SCG3532/ SCE2513	CLEO Customer Language Efficiency Outreach
SCG	SCG3530	Portfolio for the Future

In addition, the evaluation team verified the performance metrics for 10 other Education and Information programs under this contract. That is, this report documents the budget, expenditures and accomplishments for these programs. Originally, these programs were to be fully evaluated as part of this indirect impact evaluation; however the CPUC redefined the evaluation effort for these programs to "verification only" because the programs were discontinued after (or during) the 2006-2008 cycle.

Utility	Program ID	Program Name
SDGE	SDGE3031	Advanced Home Renovation
SDGE	SDGE3041	CHEERS New Construction
SDGE	SDGE3033	Industrial Energy Efficiency Acceleration
SDGE	SDGE3037	Sweetwater Schools Demonstration
SCG	SCG3529	Energy Efficiency Kiosk Pilot
SCG	SCG3504	Energy Efficiency Delivery Channel Innovation
SCE	SCE2540	One-to-Five SEED
SCE	SCE2542	Affordable Housing Energy Efficiency Alliance
SCE	SCE2547	Aggregation of Housing Agencies for Energy Retrofit and Management Projects
SCE	SCE2545	Email-Based Energy Efficiency

REPORT ABSTRACT

This report presents results of the indirect impact evaluation of the 2006-2008 Education and Information programs. Opinion Dynamics was charged with assessing the programs' success primarily through examining (1) program reach; (2) knowledge increases; (3) behavior changes; and (4) energy savings from behavior change (as indicated in Decision 05-04-051 (April 21, 2005).

This evaluation included a collection of 19 Education and Information programs that varied greatly in terms of budgets, target markets, information provided and educational methods. Furthermore, these programs varied greatly in terms of their program implementation efforts, some were implemented for the entire program cycle and some were discontinued after the program cycle. All of these factors played a role in rigor level employed to assess each program. Ultimately, the Commission's decided to assess 9 programs for knowledge impacts, behavior change impacts and energy savings.

Through applying energy savings from secondary data sources to self-reported actions taken, we found that program savings ranged from 53 to 16,950 MWh, for a total of more than 33 thousand MWh and 2 million therms net annual savings across all programs (savings equaling approximately 26,992 metric tons CO_2 reduction). In addition, while not included in the energy savings for the programs, one of the case studies for Portfolio of the Future indicated a potential savings of 27 million therms from one of the measures folded into the energy efficiency portfolio. As Education and Information programs, the nine programs covered by this evaluation effort had no explicit energy savings as part of their goals. However, we were able to document that energy savings (albeit small) are occurring as a result of these programs. Notably, however, we believe that the larger value of the programs lie in their role in the overall marketplace.

TABLE OF CONTENTS

STRUCTURE OF THE REPORT I

PROGRAMS EVALUATED II

1. EXECUTIVE SUMMARY 1

2. PURPOSE OF STUDY 6

3. INTRODUCTION TO EDUCATION AND INFORMATION PROGRAMS 8

3.1 Description of Programs Covered in the Study 8

4. STUDY METHODOLOGY 12

4.1 Overview of the Approach 12

4.2 Questions Addressed in the Evaluation 12

4.3 The Protocols and Rigor Levels Assigned to the Study 13

4.4 Description of the Study Methodology 14

4.5 Sampling Methodology 17

4.6 Expected Precision or Power Analysis Results 18

4.7 Sample Descriptions 19

4.8 Engineering Analysis of Energy Savings 33

5. RELIABILITY ASSESSMENT OF STUDY FINDINGS 34

6. EDUCATION AND INFORMATION PROGRAM VERIFICATION 37

7. PROGRAM REACH & INTENSITY 43

8. KNOWLEDGE CHANGE BY PROGRAM AND MARKET 51

9. BEHAVIOR CHANGE BY PROGRAM AND MARKET 56

10. PROGRAM ENERGY IMPACTS 65

11. PROGRAMS' ADDITIONAL VALUE IN THE MARKETPLACE 69

11.1 Role in California's Long-Term Energy Efficiency Strategic Plan 75

12. Program Cost versus Value Summary and Key Recommendations 77

12.1 Recommendations 80

Appendix A: Performance Metrics 84

Appendix B: Discussion of Data Requests 84

Appendix C: Cognitive Change Index (CCI) Methodology 84

Appendix D: Energy Savings Analysis 91

Energy Savings Measures – Uses and Attributes 92

Measure Specific Values and Assumptions 95

Measure Information for BEA 134

Additional Reference Information 136

Energy Savings Spreadsheets by Program 137

Appendix E: Comments Received on Report 147

TABLE OF TABLES

Table 1. Knowledge: Residential and Commercial Sectors 2
Table 2. Evaluation Clusters 12
Table 3. Research Questions 13
Table 4. Protocol Rigor Levels for Each Program 14
Table 5. Overview of Data Collection 15
Table 6. Overview of Data Analysis 16
Table 7. Overview of Sample Design 18
Table 8. Precision Levels for Quantitative Data Collection 19
Table 9. Response Rates, by Program 19
Table 10. Primary Data Collection Efforts by Program Activity - PGE2044 20
Table 11. Summary of Population and Sample Frames – PGE2044 20
Table 12. Primary Data Collection Efforts by Program Activity – PGE2057 21
Table 13: Summary of Population and Sample Frames – PGE2057 21
Table 14. Primary Data Collection Efforts by Program Activity – SCE2548 23
Table 15. Summary of Population and Sample Frame – SCE2548 23
Table 16. Primary Data Collection Efforts by Program Activity – SDGE3036 24
Table 17. Summary of Population and Sample Frames – SDGE3036 25
Table 18. Event Observations and Intercepts – SCG3531 25
Table 19. Telephone Interview Completes 26
Table 20. Primary Data Collection Efforts by Program Activity – SCG3531 26
Table 21. Summary of Population and Sample Frames – SCG3531 27
Table 22. Primary Data Collection Efforts by Program Activity – SCG3532/SCE2513 28
Table 23. Summary of Population and Sample Frames – SCG3532/SCE2513 28
Table 24. Summary of Population and Sample Frame – SDGE3040 29
Table 25. Primary Data Collection Efforts 30
Table 26. Characteristics of Candidate Projects for Case Study 31
Table 27. Summary of Methods from ETP Protocols as Applied to POF 32

Table 28. Sources of Secondary Data for Energy Savings 33

Table 29. How Study Addressed Potential Bias and Uncertainty 36

Table 30. Summary of 2006-2008 Education and Information Program Budget and Expenditures 38

Table 31. 2006-2008 Education and Information Program Goals and Accomplishment Status 41

Table 32. 2006-2008 Education and Information Program Reach & Intensity 46

Table 33. Percentage of Residential Survey Respondents Who Shared Program Information with Others 48

Table 34. Percentage of Commercial Survey Respondents Who Shared Program Information with Others 49

Table 35. Downstream Residential Market Knowledge and Behavior Impacts 51

Table 36. Downstream Commercial Market Knowledge and Behavior Impacts 53

Table 37. Downstream Residential Market Behavior Impacts 56

Table 38. Actions and Behaviors Induced In the Residential Market 61

Table 39. Downstream Commercial Market Behavior Impacts 63

Table 40. Actions and Behaviors Induced by Commercial Programs 64

Table 41. 2006-2008 Education and Information Program Net Annual Energy Savings 66

Table 42. 2006-2008 Education and Information Programs Help the Long-Term Energy Efficiency Strategic Plan 76

Table 43. 2006-2008 Education and Information Program Cost Versus Value 78

Table 44. Variation by Number in CCI and Weighting 90

Table 45. Relationship to Taking Action and CCI 90

TABLE OF FIGURES

Figure 1. Target Markets for Education and Information Programs.....44
Figure 2. MWh per Person in Savings Calculation.....67
Figure 3. CCI with all 3 concepts.....89
Figure 4. Direct Influence Question.....89

1. EXECUTIVE SUMMARY

California's 2006-2008 Education and Information programs are comprised of 19 separate programs united under this evaluation effort due to the fact that they each provide energy education and information and most were each implemented by a third-party implementer (not by a California Investor-Owned Utilities)[1]. Of the 19 programs covered under this effort, the evaluation team evaluated 9 programs for indirect impacts, and verified the accomplishments of the remaining 10 programs. For these 10 programs, we document the budget, expenditures and success in achieving performance metrics; we did not evaluate these 10 programs for impacts as the CPUC decided to stop full evaluation activities for programs that were known to be discontinued after the 2006-2008 program cycle.[2]

Overall spending on these 19 programs ranged from a low of $356 to a high of $3 million, for a total of $21.9 million (~$3.3 million shy of the initial budgeted amount).

While the performance metrics, or measurable goals, defined by each program differed greatly across all programs, we found that across the 19 programs, 11 met or exceeded their goals, 4 fell short of meeting all of their goals and 4 programs were discontinued before the program cycle ended. (See Section: Program Costs and Achievements)

Individual program findings for each of the 19 programs are provided in a separate volume of this report (See the Program-By-Program presentation, Volume II). Key findings across the nine continuing efforts include the following:

- **Target Markets:** Of the nine programs that were evaluated for indirect impacts, two played a role in the commercial market, targeting commercial end-users. Another six targeted the residential market: four specifically targeting residential end-users, and two aimed at market actors and policy advocates in the residential market, with the goal of putting mid-stream market actors in a position to teach and encourage residential and commercial end-users to take action to save energy. Finally, one of these programs played an important role further upstream, in the new product development stage, by conducting the research necessary for new energy efficient emerging technologies to move into a resource acquisition program.
- **Reach:** The reach of programs varies greatly, from 157 to 18,000+ individuals. The intensity of the information provided also varies greatly; however, these Education and Information programs tend to show an inverse relationship between reach and intensity. For example, while one program reached a large number of participants, the "reach" method only touched a participant for 5 minutes to relay general ways to save energy to residential end-users. In other cases where the programs reached a small number of participants, the educational method was more intense as it provided a deeper level of technical information over the course of several hours or days to midstream market

[1] One exception is the Energy Efficiency Delivery Channel Innovation Program (SCG3504) which was implemented by SCG.

[2] One exception to this is the SDGE3036 Time of Sale Energy Efficiency Check Up Program. This program was discontinued at the end of 2008 but was still evaluated for energy impacts as it was determined to be informative for other future program efforts.

actors. The intensity of information can be valuable at low and high levels depending on the type energy efficiency knowledge that a program intends to impart.

- Our evaluation also documented a ripple effect in the market for many of the programs studied, i.e., the information was often shared with the direct participants' sphere of influence including friends, family and colleagues. Therefore, the reach of these programs extends beyond the number of direct program participants. Education and Information programs targeting mid-stream market actors were also shown to have a strong multiplier effect in the market, i.e., the information was transferred to the market actors' clients as well as the market actors influencing the energy use of many buildings. Therefore, the reach of Education and Information programs that target these mid-stream market actors greatly extends beyond the number of direct participants into the residential and commercial segments they serve.

- **Knowledge Change:**
  - **Residential Market:** Participants reporting very large energy efficiency knowledge increases ranged from a high of 56% of PACE participants to a low of 37% among Time of Sale participants.
  - **Commercial Market** In the commercial sector, 60% of PACE participants reported very large energy efficiency knowledge increases, while 24% of Business Energy Assessment participants indicated a very large change.

Table 1. Knowledge: Residential and Commercial Sectors

Program	Education Method	Target Market	% Reported a Very Large Knowledge Increase[3]
Residential			
PACE Energy Efficient Ethnic Outreach (SCG3531)	Brief booth interaction	Chinese and Vietnamese Residential	56%
Custom Language Efficiency Outreach (SCG3532/SCE2513)	2-hour seminars	Chinese and Vietnamese Residential	51%
Build It Green (PGE2057)	Green Home Tour	General Residential	41%
Time of Sale Energy Check-Up (SDGE3036)	Audit at Time of Home Sale	General Residential	37%
K-12 Energy Efficiency Education (SDGE3032)	K-12 Curriculum	Under 18 years of age	Qualitatively Assessed: Determined Very Likely to Increase Knowledge
Commercial			
PACE Energy Efficient Ethnic Outreach (SCG3531)	Chinese and Vietnamese	Business walk-in presentation	60%
Business Energy Assessment (SDGE3040)	Small and medium-sized businesses	Online Audit	24%

[3] Gave a 6 or 7 rating on a 7-point scale

- **Behaviors**: The programs were successful in getting participants to take action. Among commercial participants, 83% of commercial PACE participants and 65% of Business Energy Assessment participants took action. The most frequent actions included upgrading lighting and replacing refrigerators. The percent of residential participants that installed an energy efficient measure ranges from a high of 87% among CLEO participants to a low of 70% among Time of Sale participants, and focused primarily on the installation of CFLs and low-flow showerheads. In addition, the percent of market actor participants that recommended energy efficient measures to their residential clients ranges from a high of 97% to a low of 83%. The most frequent actions taken by their residential clients including upgrading lighting and duct systems.
- **Energy and CO_2 Savings**: Through applying energy savings from secondary data sources to self-reported actions taken, we found that program savings ranged from 53 to 16,950 MWh, for a total of approximately 33,230 MWh and 2.13 million therms net annual savings across all programs (savings equaling approximately 26,992 metric tons CO_2 reduction). [4] In addition, while not included in the energy savings for the programs, one of the case studies for Portfolio of the Future indicated a potential savings of 27 million therms from one of the measures that could be used in a program in the 2010-2012 energy efficiency portfolio. These possible savings, if present, would be included in future rebate program savings in the residential sector. As Education and Information programs, the nine programs covered by this evaluation effort had no explicit energy savings as part of their goals. However, we were able to document that energy savings (albeit small) are occurring as a result of these programs. Notably, however, we believe that the larger value of the programs is their role in the overall marketplace (Described below).

Our research shows that these programs play other important functions that cannot be captured in terms of kWh or therms. These include:

1. **Channeling customers to resource acquisition programs:** Six of the nine Education and Information programs directly targeted residential and/or commercial end-users. Five of these six programs emphasized channeling residential and commercial customers into IOU resource acquisition programs to some degree. Furthermore, some of these programs incorporated other utility programs directly into their outreach methods, such as the Home Energy Efficiency Survey (HEES). The five programs were able to channel anywhere from 4% to 30% of their participants into other utility programs. The large range can often be explained by the degree to which each program communicated this type of information to its participants. (See Section: Programs' Additional Value in the Marketplace)
2. **Contributing to socially equitable access to energy efficiency information:** Two of the nine programs (the PACE Energy Savings Project and the Custom Language Efficiency Outreach programs) filled a gap in the IOUs' portfolio of resource acquisition programs by targeting residential market segments that would likely be overlooked by IOU or statewide energy education efforts due to language barriers. As such, these programs contributed to creating socially equitable access the

[4] Note that this is for one year, not lifecycle savings. Source: U.S. EPA (see Additional Reference Information, Appendix D).

energy efficiency information in Southern California. These kinds of programs can support both the Marketing, Education and Outreach and Residential strategies of the State's energy efficiency strategic plan.

3. **Intervening in the marketplace at an optimal point in time:** By program design, three of the nine programs (the Time of Sale, Southern California Home Performance and Build It Green programs) provide end-users with energy efficiency information at an optimal point in time when end-users are already in the market for home improvements or just before end-users will be in the market for home improvements.

4. **Giving the market a stepping stone to "whole home" energy efficiency:** By program design, two of the nine programs (the Southern California Home Performance and Build It Green programs) give residential end-users a stepping stone into the concept of a "whole house" approach to energy efficiency.

5. **Educating the next generation:** By design, the K-12 Energy Efficiency Education Program is making energy efficiency and conservation education a part of the next generation's standard K-12 science curriculum. Youths, under the age of 18, are often not targeted by resource acquisition programs as they are typically not the purchasers or decision-makers in a home. However, The K-12 Energy Efficiency Education program provides energy conservation and efficiency concepts to this younger population with the goal of building a knowledge base over time that will translate into both immediate and long-term energy savings. This type of program supports the State's (future)- Work Force Education and Training initiatives.

6. **Fostering company-wide environment initiatives:** By design, the Business Energy Assessment program that directly targets commercial customers helps foster company-wide environment and energy saving initiatives by providing easily consumable and sharable information.

7. **Stimulating economic growth:** By design, two of the programs (the Southern California Home Performance and Time of Sale programs) that target midstream market actors help train market actors to sell the benefits of energy efficiency with the expectation that promoting energy efficiency will help expand the market actors' business opportunities. The programs trained market actors, i.e., realtors and remodeling contractors, to market or "sell" the benefits of energy efficiency to their residential customers. Using energy efficiency as a "selling point" can help market actors further market their businesses and ultimately lead to business growth.

8. **Ensuring that the residential building market complies with energy codes and standards:** While many of the programs attempted to move the residential and commercial markets beyond energy standards, one program focused on ensuring that builders and code officials are brought up to code. Many programs focus on the leading edge of the energy efficiency market, so pulling up those that are falling behind standards is an important gap in the current offerings.

9. **Accelerating market adoption of new energy efficient technologies:** Education and Information programs that support the research and development for new energy

efficient technologies can play an important role in helping to advance the market's acceptance of these new products by providing the needed data to include them into resource acquisition programs. The SCG3530 Portfolio for the Future program helps to get feasible and acceptable new energy efficient technologies into the market through inclusion in resource acquisition programs.

10. **Advancing local energy policies:** The Build It Green program helped local governments pass mandatory green building requirements using principles from the GreenPoint Rated Checklist.

We provide a few recommendations based on our indirect impact research to help with future program design and evaluation efforts for Education and Information programs. As such, we recommend the following:

- Determine where Education and Information programs are needed to achieve each sector's goals in the Long-Term Energy Efficiency Strategic Plan for California.
- Set realistic expectations for new Education and Information programs by acknowledging the time it takes to ramp up and "future" value for those that take longer to ramp up.
- Consider that programs designed to target market actors often have the potential to touch more individuals due to the multiplier effect.
- Success metrics should be based on the role each program is expected to play.
- Consider the best way to group Education and Information programs for future evaluation efforts.
- Set realistic expectations on what can and should be performed for each program evaluation given its size and budget.
- Allow evaluators to directly contact third parties to collect program information.

2. PURPOSE OF STUDY

The overarching purpose of this evaluation is to assess the indirect energy efficiency impacts of California's Education and Information Programs in program years 2006-2008. Opinion Dynamics led the evaluation team with the support of Summit Blue Consulting and Jai J. Mitchell.

The estimated cost of the indirect impact research was approximately $800,000 across the three-year program cycle (~3% of the budgets across all programs included). Decision 05-04-051 (April 21, 2005) indicates that for audit and targeted information programs:

> "The performance basis should measure net benefits based on program participants being: a) moved to take action through a resource program; b) taking an action themselves based on the audit/targeted education program, c) doing both of the above." (p.60)

While for education/training programs:

> "For schools, universities and other training programs, the performance basis should be based on: a) attitude, awareness and knowledge of students; b) reasonable impacts on energy savings or intention to act based on students' actions." (p.61)

Our evaluation used these metrics as well as those defined in the California Protocols[5] (Protocols) for indirect impact evaluation to assess the value of the program. Below we provide the researchable issues as outlined in the initial evaluation plan for the information and education evaluation effort.

1. What is the reach of the programs?
2. What education or information was provided and which behaviors (and resource programs) were promoted by the programs?
3. How likely are the programs to induce behavioral change among the targeted audience?
4. What percentage of those targeted and exposed to the program changed behaviors as a result of the program efforts?
5. What is the change in awareness of energy saving opportunities as a result of program efforts?
6. What percentage of participants was channeled into resource programs?
7. What indirect behaviors were taken by those people who received education or "treatment" through the programs?
8. What direct energy saving behaviors were taken by those who received education or "treatment" through the programs where energy savings can be estimated?
9. What are the net energy-saving behaviors taken by those who receive education or "treatment" through the programs where net behaviors can be estimated?

[5] California Energy Efficiency Evaluation Protocols: Technical, Methodological, and Reporting Requirements for Evaluation Professionals. April 2006.

10. What are the net energy savings as a result of the programs where net energy savings can be estimated?
11. What is the value of the program versus the cost of the program?

This indirect impact evaluation included 19 programs at the beginning of the effort. Of these, the evaluation team evaluated 9 programs for indirect impacts, and verified the accomplishments of the remaining 10 programs. For these 10 programs, we document their budget, expenditures and accomplishments; they were not evaluated for impacts as the CPUC decided to stop all evaluation activities because the programs were known to not be continued past the 2006-2008 program cycle.

3. INTRODUCTION TO EDUCATION AND INFORMATION PROGRAMS

California's 2006-2008 Education and Information programs are comprised of 19 separate programs united under this evaluation effort due to the fact that they each provide energy education and information and all but one was implemented by a third-party implementer. We originally categorized these programs based on program type: Residential Building Market Programs (7); Broad Consumer Outreach Programs (4); Commercial and Industrial Programs (3); Public Housing Programs (2); School Programs (2); and Demonstration Based Technology Projects (1). Below, we provide a short description of each program by category.

3.1 *Description of Programs Covered in the Study*

3.1.1 Residential Building Market Programs

Seven of the 19 programs in the Education and Information portfolio fall into the category of residential building programs. Though the tactics and target audience of these programs differ, the programs share an over-arching goal of increasing the efficiency of the existing and planned residential building stock in California.

- PGE 2044 - Builder Energy Code Training: Builder Energy Code Training (BECT) provides training to the building industry to improve compliance with Title 24 energy codes for residential new construction.
- PGE 2057 - Green Building Technical Support Services - Build it Green: The program is run by Build It Green, a non-profit whose mission is to promote healthy, durable, energy and resource-efficient buildings in California. Build It Green connects consumers and building professionals with the tools and technical expertise they need to build quality green buildings. The program runs workshops, green home tours, and presents at a variety of community events.
- SCE 2548 - Southern California Home Performance Program: The Southern California Home Performance Program trains contractors to market and provide whole house energy efficiency services to their customers. The program operates a nine-day training course for builders.
- SDGE 3031 - Advanced Home Renovation: The program renovated a pre-1978 code home and used this state-of-the-art energy efficient remodeled home to demonstrate the potential for energy efficiency retrofits in pre-1978 code homes. This program was not continued for the 2010-2012 program cycle.
- SDGE 3036 - Time of Sale Energy Efficiency Check-up: The Time of Sale Energy Checkup Program provided realtors and home inspectors with energy efficiency training and incentives enabling realtors to recommend, and inspectors to provide, time-of-sale energy audits. This program was not continued for the 2010-2012 program cycle.
- SDGE 3041 - CHEERS New Construction: CHEERS worked with the building community to

capture "missed" energy savings in a way that was cost-effective and almost invisible. The primary method they used to accomplish this was Energy software. This program was not continued for the 2010-2012 program cycle.

- SCG 3529 - Energy Efficiency Kiosk Pilot Program: The Energy Efficiency Kiosk Pilot Program (EEKPP) promoted energy efficiency upgrades to homeowners and small business owners through the development of an interactive kiosk, which was placed in lending institutions, and other key locations. This program was not continued for the 2010-2012 program cycle.

3.1.2 Broad Consumer Outreach Programs

Four of the 19 programs in the Education and Information portfolio fall into the category of broad consumer outreach programs, with two of the programs focusing on specific Hard-to-Reach populations. Combined, the four programs attempt to raise energy efficiency awareness and promote energy efficient behaviors in the residential, commercial, and industrial sectors, with an emphasis on residential customers.

- SCE 2545 - Email-Based Energy Efficiency: The program offered a personalized email/Web based information system, designed to subscribe a large segment of residential customers to an ongoing dialog on energy efficiency and to direct customers to other SCE programs and resources. This program was not continued for the 2010-2012 program cycle.
- SCG 3504 - Energy Efficiency Delivery Channel Innovation Program: Energy Efficiency Delivery Channel Innovation undertook marketing and outreach efforts for SoCalGas resource acquisition programs. The program worked with multiple IOU staff and was primarily an online outreach service that attempted to cover all market sectors: Residential, Non-Residential, New Construction, Collaborations, and Third-Party Programs. This program was not continued for the 2010-2012 program cycle.
- SCG 3531 - PACE Energy Efficient Ethnic Outreach Program: PACE aims to raise awareness of energy efficiency in ethnic communities within the SoCalGas territory. The program provides short energy audit services to ethnically hard to reach residential and commercial customers. The program operates a variety of outreach activities, including in-person and over the phone energy audits.
- SCG 3532/SCE 2513 - CLEO Custom Language Efficiency Outreach Program: CLEO serves the ethnic Chinese, Vietnamese and Indian Sub-continent customers in SoCalGas and SCE service areas. The program offers a variety of energy efficiency outreach activities, including in-person and over the phone energy audits.

3.1.3 Commercial and Industrial Programs

Three of the 19 programs in the Education and Information portfolio exclusively target commercial customers. The three programs focus on educating market actors in a variety of commercial enterprises about opportunities to increase the energy efficiency of their operations.

- SCE 2540 - One-to-Five Program (SEED program): The program provided detailed energy audits to food processing companies. The One-to-Five training sessions were held

onsite, and included a walk-through technical audit that non-engineers could participate in. The program went beyond technical fixes, as the program worked with the client to create a company-specific plan, with energy savings target and objectives. This program was not continued for the 2010-2012 program cycle.

- SDGE 3033 - Industrial Energy Efficiency Acceleration: The IEEA programs offered in-depth energy audits to large industrial customers. The program expected to help 40 participants complete an Energy Management Improvement Action Plan (EMIAP) by 2008. Ten participants were expected to continue on to stage 2, where they would be given additional support and training to implement the EMIAP plan. This program was not continued for the 2010-2012 program cycle.
- SDGE 3040 - Business Energy Assessment: The Business Energy Assessment provides small to medium sized businesses with an easy-to-use online business assessment/audit solution that delivers practical outcomes for businesses and facilitates increased uptake of efficiency improvement recommendations.

3.1.4 Public Housing Programs

Two of the 19 programs in the Education and Information portfolio fall into the category of public housing programs. The two programs differ in their tactics and target audience, however, they are both implemented in a public housing setting, and aim to have effects (either direct or indirect) on energy usage in public housing. These two programs were not continued for the 2010-2012 program cycle.

- SCE 2542 - Affordable Housing Energy Efficiency Alliance: AHEEA worked with Public Housing Authorities, Redevelopment Agencies, and non-profit housing associations that were in need of technical energy efficiency assistance. The program helped them identify, implement, and promote energy efficiency programs to their constituent property owners and developers.
- SCE 2547 - Aggregation of Housing Agencies for Energy Retrofit and Management Projects: The program used aggregation to bring efficiency and energy savings to a market that has been traditionally ignored: small and medium-sized public and assisted housing agencies (containing 1,200 units or less).

3.1.5 School Programs

Two of the nineteen programs in the Education and Information portfolio fall into the category of school-related programs. The two programs differ in their tactics and target audience, however, they are both implemented in a school setting, and will both have effects (either direct or indirect) on energy usage in schools and/or by students and their families.

- SDGE 3032 - K-12 Energy Efficiency Education: The program aims to change the next generation's attitudes and understanding of energy efficiency through developing grade specific energy efficiency curriculum for San Diego schools.
- SDGE 3037 - Sweetwater Schools Demonstration: The program used a demonstration school site to showcase two energy efficiency technologies. The school demonstration site had dimmable classroom lighting (goes beyond code), and next-generation

evaporative coolers (swamp cooler). The program hosted open houses at the school to demonstrate to other schools in the SDGE territory the benefits of the technologies. This program was not continued for the 2010-2012 program cycle.

3.1.6 Demonstration-Based Technology Projects

One of the nineteen programs in the Education and Information portfolio focuses on bringing new energy efficient technologies to the marketplace. This non-resource program was created as a development tool for the IOUs' emerging technology programs.

- SCG 3530 - Portfolio for the Future: A program that aims to develop a dynamic "Emerging Technologies and Best Practices Program." The program inventories, characterizes, assesses and ranks opportunities for development of new technologies, products, services and best practices; facilitates partnering with a wide variety of stakeholders; developed an initial portfolio of pilot opportunities; and, finally developed a roadmap, investment plan and implementation plan for the technologies.

4. STUDY METHODOLOGY

Below we provide the methods used within the study. The reporting structure for this section follows the evaluation protocols; however, we have condensed sub-sections where possible. Note that we did not include sections that were not relevant for indirect impact evaluation efforts.

4.1 Overview of the Approach

For this evaluation effort, we originally divided the 19 programs within this evaluation group into six clusters. We based the clusters on the overarching target audience that the programs intended to reach and the primary activities employee. The total number of programs in each of these clusters is provided in Table 2.

Table 2. Evaluation Clusters

Evaluation Cluster	Verified Only Programs	Indirect Assessment Programs
Residential Building	3	4
Broad Consumer Outreach	2	2
Commercial & Industrial	2	1
Public Housing	2	0
School	1	1
Demonstration Based Technology	0	1
Total	10	9

Of the 19 programs, 11 were discontinued by the utilities after (or during) the 2006-2008 program cycle. As such, the CPUC determined that these should be assessed for verification purposes only. For nine programs, the evaluation team conducted both a verification of accomplishments and an assessment of indirect impact assessment.[6] Where possible, we assessed both energy impacts and non-energy impacts. This evaluation effort relied upon self-reported information, both quantitative and qualitative, to measure program impacts. Given that each of the nine programs were unique in terms of information provided, education methods, target markets and expected outcomes, we employed a different approach to evaluating each program. However, there were some commonalities in our approach, such as the approach to calculating energy savings for each program (described below) and in the influence of the program on those savings.

4.2 Questions Addressed in the Evaluation

We originally identified 11 researchable issues in the plan. These questions are shown in Table 3.

[6] SDGE3036 was discontinued for PY2010-2012, but an indirect impact assessment of the program occurred as it was expected to inform future programs.

Table 3. Research Questions

Number	Research Question
1	What is the reach of the programs?
2	What education or information was provided and which behaviors (and resource programs) were promoted by the programs?
3	How likely are the programs to induce behavioral change among the targeted audience?
4	What percentage of those targeted and exposed to the program changed behaviors as a result of the program efforts?
5	What is the change in awareness of energy saving opportunities as a result of program efforts?
6	What percentage of participants was channeled into resource programs?
7	What indirect behaviors were taken by those people who received education or "treatment" through the programs?
8	What direct energy saving behaviors were taken by those who received education or "treatment" through the programs where energy savings can be estimated?
9	What are the net energy-saving behaviors taken by those who receive education or "treatment" through the programs where net behaviors can be estimated?
10	What are the net energy savings as a result of the programs where net energy savings can be estimated?
11	What is the value of the program versus the cost of the program?

4.3 The Protocols and Rigor Levels Assigned to the Study

The indirect impact levels as specified by the Protocols are as follows:

1. Verify: This category includes verifying quarterly reports through review of program documents and databases, and ensuring the efforts occurred rather than addressing outcomes of the effort.
2. Basic: Results estimate the program's net changes on the behavior of the participants, i.e., the impact on participant behavior.
3. Standard: Results are determined using net behaviors as reported in survey efforts and estimated savings for these behaviors. Estimates are drawn from either prior studies and/or engineering calculations.
4. Enhanced: Results are determined using net behaviors as reported in survey efforts and estimated savings for these behaviors, as well as field observations/testing to verify the occurrence of the net behavioral change. There were no enhanced rigor level assessments within this study.

The table below shows the rigor level for each of the programs in the evaluation portfolio. We note that not all program activity assessments within each of the programs met the rigor level shown in the table below, but the key elements of the programs were evaluated in such a way to provide results that met the level shown in the table below. For example, for the SDGE 3040 Business Energy Assessment Program, the evaluation estimated energy savings for the core program activity (e.g., audits) but not for any complementing outreach efforts

that were not considered core to the program (e.g., distribution of direct mailings).

Table 4. Protocol Rigor Levels for Each Program

Utility	Program ID	Program Name	Rigor Level
PGE	PGE2044	Builder Energy Code Training	Standard
PGE	PGE2057	Green Building Technical Support Services – Build It Green	Basic
SCE	SCE2548	Southern California Home Performance	Standard
SCG	SCG3530	Portfolio for the Future	Emerging Technology Protocol
SCG	SCG3531	PACE Energy Efficient Ethnic Outreach	Basic
SCG & SCE	SCG3532/ SCE2513	CLEO Customer Language Efficiency Outreach	Basic
SDGE	SDGE3032	K-12 Energy Efficiency Education	Standard
SDGE	SDGE3040	Business Energy Assessment	Standard
Programs no longer continuing into 2010-2012			
SCE	SCE2540	One-to-Five SEED	Verify
SCE	SCE2542	Affordable Housing Energy Efficiency Alliance	Verify
SCE	SCE2545	Email-Based Energy Efficiency	Verify
SCE	SCE2547	Aggregation of Housing Agencies for Energy Retrofit and Management Projects	Verify
SCG	SCG3504	Energy Efficiency Delivery Channel Innovation	Verify
SCG	SCG3529	Energy Efficiency Kiosk Pilot	Verify
SDGE	SDGE3031	Advanced Home Renovation	Verify
SDGE	SDGE3033	Industrial Energy Efficiency Acceleration	Verify
SDGE	SDGE3036	Time of Sale Energy Efficiency Check Up	Basic
SDGE	SDGE3037	Sweetwater Schools Demonstration	Verify
SDGE	SDGE3041	CHEERS New Construction	Verify

Our evaluation has met the CPUC's rigor level designated within the evaluation plan for these programs.

4.4 Description of the Study Methodology

Here we describe the methods used for this research and indicate how the data were collected and subsequently analyzed. Table 5 shows the how data were collected for analysis of each program. Table 6 contains the analysis for each evaluation activity. This section has just the overview of the methods employed in this study. Further details on sample design, sample size, and how the data were collected are provided in Section 4.7.

Our data collection was structured around the theme of: 1) see if there was the potential for knowledge change to occur that could cause energy efficiency actions, 2) measuring self-reported change in knowledge and actions taken, 3) determining the influence of the program on the actions, and 4) using secondary data to apply energy savings to the stated actions.

Table 5. Overview of Data Collection

Program	Observation	Intercepts	Depth Interviews	CATI	Internet Survey	Secondary Data
Builder Energy Code Training (BECT), PGE2044	X		X	X		X
Build it Green (BIG), PGE2057	X		X		X	X
Southern California Home Performance Program, SCE2548	X		X	X		X
Portfolio for the Future, SCG3530			X			X
PACE Energy Efficient Ethnic Outreach Program, SCG3531	X	X		X		X
Custom Language Efficiency Outreach Program (CLEO), SCG3532/SCE2513	X			X		X
K-12 Energy Efficiency Education, SDGE3032 (implementer performed much data collection)	X		X			X
Time of Sale (TOS), SDGE3036	X				X	X
Business Energy Assessment (BEA), SDGE3040					X	X

The data collected was analyzed as shown in Table 6.

Table 6. Overview of Data Analysis

Program	Analysis
Builder Energy Code Training (BECT), PGE2044	Descriptive statistics; qualitative analysis; engineering analysis of energy savings
Build it Green (BIG), PGE2057	Descriptive statistics; qualitative analysis; engineering analysis of energy savings
Southern California Home Performance Program, SCE2548	Descriptive statistics; qualitative analysis; engineering analysis of energy savings
Portfolio for the Future, SCG3530	Descriptive statistics; qualitative analysis
PACE Energy Efficient Ethnic Outreach Program, SCG3531	Descriptive statistics; qualitative analysis; engineering analysis of energy savings
Custom Language Efficiency Outreach Program (CLEO), SCG3532/ SCE2513	Descriptive statistics; qualitative analysis; engineering analysis of energy savings
K-12 Energy Efficiency Education, SDGE3032	Descriptive statistics; qualitative analysis; engineering analysis of energy savings
Time of Sale (TOS), SDGE3036	Descriptive statistics; qualitative analysis; engineering analysis of energy savings
Business Energy Assessment (BEA), SDGE3040	Descriptive statistics; Inferential statistics (t-tests, z-tests) p-values of less than 0.10 were considered statistically significant; engineering analysis of energy savings

Data analysis efforts also involved the analysis of secondary data for all programs.

Analysis of Net Behaviors

Information, education and training program efforts—unlike a financial incentive—do not align with the "per unit" assumptions of the set of standard self-report net-to-gross (NTG) questions currently in use in California. For example, the standard NTG battery asks about timing and quantities, which allows the parsing out of energy when an individual buys two or three measures. However, information, education and training generally contribute to an overall decision, which is very difficult to separate out in people's minds, especially using survey questions. When determining a valid method to measure the net effects of the diverse set of information programs, we considered the following:

- Education and information are not as tangible as a financial rebate.
  - While some efforts – like a class – may occur on a particular day, other efforts – such as community events, advertising, receiving a brochure or visiting a website – are harder to attribute to one particular day, and it may be difficult for an individual to recall even if they were exposed, much less when. This makes causality difficult to assess well.[7]
- Education and information cannot always be separated from other efforts. That is, these efforts often lead to the next step in a web of related behaviors and influences that ultimately lead to the energy saving action.
  - Notably, even with rebates or financial incentives, - at some point in time education about both the rebate and the measure or action that occurs prior to the customer taking any action. As such, "education" cannot always be teased apart from the more tangible rebate (e.g., asking, "How much did learning about the rebate affect your action versus how much did the actual rebate affect your action?" These are difficult to separate.)[8]
- Education and information are generally thought of as contributing to actions; they lay the groundwork for the ability to take reasonable actions. However, they are not usually the sole reason (or even a critical reason) for taking action.
  - While it may be a more critical factor if the respondent was totally unaware of the action prior to the effort, asking what would have been done in the absence of seeing an advertisement, attending a training, or viewing a brochure is not as likely to provide valuable information, as it becomes too hypothetical and abstract to obtain valid measurements. For example, if the question is asked, *If you did not know about this action, what do you think you would have done?* The obvious response is: *Not do that action.* However, it is highly likely that learning more about an action provided the "tipping point" that, combined with the ability to make a purchase or take an action not requiring financing, brought about energy saving actions.

These items formed the basis of the questions that make up the cognitive change index (CCI). The CCI is similar to the NTG - it is a percent value and is calculated using several questions. The question choices and how to create the index were discussed at length and agreed to with the CPUC and MECT prior to moving forward with the evaluation. Appendix C: Cognitive Change Index (CCI) Methodology provides CCI details.

4.5 Sampling Methodology

We used the sampling methodology shown in Table 7 for each program.

[7] Roger Tourangeau (in *The Science of Self-Report. Implications for Research and Practice*) calls this an encoding error – people never form a representation of an event or what is formed is so sketchy "as to render retrieval difficult or impossible" (p. 31).

[8] This difficulty is similar to when Tourangeau writes, "What we retrieve from memory often consists of our current beliefs about an incident, beliefs that reflect what we actually experienced (and remember), what we did not experience but infer, and what we learned later on." (p 35)

Table 7. Overview of Sample Design

Program	Sample Design
Builder Energy Code Training (BECT), PGE2044	Purposive Sampling of Observations and Depth Interviews Census of eligible survey participants
Build it Green (BIG), PGE2057	Purposive Sampling of Observations and Depth Interviews Census of eligible survey attendees and council members
Southern California Home Performance Program, SCE2548	Purposive Sampling of Observations and Depth Interviews Census of eligible survey participants
Portfolio for the Future, SCG3530	Purposive Sampling for the two case studies included Census for aggregate analysis and portfolio evaluation components.
PACE Energy Efficient Ethnic Outreach Program, SCG3531	Purposive Sampling of Observations and Intercepts Random Sample for survey
Custom Language Efficiency Outreach Program (CLEO), SCG3532/SCE2513	Purposive Sampling of Observations Random Sample for survey
K-12 Energy Efficiency Education, SDGE3032	Purposive Sampling of Observations and Depth Interviews
Time of Sale (TOS), SDGE3036	Purposive Sampling of Observation Census of eligible survey participants
Business Energy Assessment (BEA), SDGE3040	Census of eligible survey participants

4.6 Expected Precision or Power Analysis Results

As stated in the protocols, power is the probability that one will detect an "effect" that exists in the true population that is being studying. Researchers use it when conducting different types of analyses, but it is used most typically for regression analyses. Researchers can use power analysis to determine sample size or retrospectively to determine the actual power of a sampled population. When the research uses a census, power analysis is moot.

The protocols specified power analysis for regression models or survival analysis specifically targeted to energy savings. Our use of secondary data to calculate energy savings does not fall into either of these categories, nor did we perform any sort of statistical hypothesis testing in these analyses (where a power analysis would be useful).

Precision is also a function of a sample: the precision indicates the confidence that the value found in the sample is similar to that found in the population. For our indirect impact evaluation, the percent of people taking an action (i.e. behaviors) is the appropriate value for a precision calculation. We met the precision levels for percentages as shown in Table 8.

Table 8. Precision Levels for Quantitative Data Collection

Program	Precision
Builder Energy Code Training (PGE2044)	90 ± 7
Build It Green (PGE2057)	Attempted Census – Not applicable (NA)
Southern California Home Performance (SCE2548)	Attempted Census – NA
Time Of Sale (SDGE3036)	Attempted Census – NA
Business Energy Assessment (SDGE3040)	Attempted Census - NA
PACE (SCG3531)	90 ± 8 (residential) 90 ± 12 (nonresidential)
CLEO (SCG3532/SCE2513)	90 ± 8

Note: SDGE3032 and SCG3530 did not have quantitative data collection.

4.7 Sample Descriptions

Next, we present the sampling issues handled within each data collection activity by program. Table 9 shows response rates by program. In calculating response rates, Opinion Dynamics consulted AAPOR (American Association for Public Opinion Research) standard definitions of survey dispositions[9]. Opinion Dynamics selected AAPOR's response rate #2, which counts partial interviews as respondents.

Table 9. Response Rates, by Program

Program	Response Rate
Builder Energy Code Training (BECT), PGE2044	24%
Build it Green (BIG), PGE2057 - Councils	7%
Build it Green (BIG), PGE2057 - Home Tours	14%
Southern California Home Performance Program, SCE2548	41%
PACE Energy Efficient Ethnic Outreach Program, SCG3531 – Chinese, Residential	13%
PACE Energy Efficient Ethnic Outreach Program, SCG3531 – Chinese, Non-residential	33%
PACE Energy Efficient Ethnic Outreach Program, SCG3531 – Vietnamese, Residential	11%
PACE Energy Efficient Ethnic Outreach Program, SCG3531 – Vietnamese, Non-residential	31%
Custom Language Efficiency Outreach Program (CLEO), SCG3532/SCE2513 – Chinese	20%
Custom Language Efficiency Outreach Program (CLEO), SCG3532/SCE2513 - Vietnamese	13%
Time of Sale (TOS), SDGE3036 - Realtors	18%
Time of Sale (TOS), SDGE3036 - Homeowners	4%
Business Energy Assessment (BEA), SDGE3040	7%

Next we present the specific information about the primary data collection for each program.

[9] AAPOR. *Final Dispositions of Case Codes and Outcome Rates for Surveys.* The American Association for Public Opinion Research, Revised 2009.

4.7.1 Builder Energy Code Training (BECT), PGE2044

Opinion Dynamics utilized multiple sources of data, secondary and primary, to build a chain of evidence for the program's energy and non-energy impacts. Secondary data collection included a review of program documents and databases. For primary data collection, we observed a classroom training session (on October 19, 2007 in Walnut Creek, California) and a construction site training session (on May 8, 2008 in Morgan Hill, California) and conducted two depth interviews with course attendees in October 2008 while on-site. These data collection efforts allowed us to understand the education and information provided by the program and to determine the potential behavior changes to which the program likely contributed.

Furthermore, we fielded a telephone survey of builders and code officials who attended a BECT course between 2006 and 2008. A sample of attendees was created from sign-in sheets provided by the program implementer. From these sheets, we were able to create a sample frame of 736 builders and code officials with telephone numbers. Out of the sample of 736 individuals with contact information, 107 BECT course attendees completed a phone survey between October and December 2008. Of the 107 individuals who completed the survey, 44 said they were builders and 63 said they were code officials.

Table 10 summarizes our primary data collection efforts by each of the program activities we examined.

Table 10. Primary Data Collection Efforts by Program Activity - PGE2044

Program Component	Observations	Depth Interviews	Surveys
Classroom Trainings	1 classroom training session observed in Oct 2007 in Walnut Creek, CA	Interviewed 2 course attendees in October 2008	Conducted phone survey with attendees between October and December 2008 (n=107)
On-site Trainings	1 construction site training session observed in May 2008 in Morgan Hill, CA	--	

Table 11 summarizes the population and sample frames across our primary data collection efforts.

Table 11. Summary of Population and Sample Frames – PGE2044

Target	Research Method	Population Size	Sample Size/ Frame	Completes
Classroom only/ Any course with Field Component	Telephone survey	1,978	736	107

4.7.2 Build it Green (BIG), PGE2057

We drew inferences from observations, participant depth interviews, and surveys to assess the potential impact (both energy and non-energy) of the program. Secondary data collection included a review of program documents and databases, and interviews with program staff. Primary data collection included surveys, observations, and depth interviews. This approach also allowed us to consider the program from three separate perspectives (i.e., consumer, professional, and policymaker). Table 12 summarizes our primary data collection efforts by each of the three program activities we examined in depth.

Table 12. Primary Data Collection Efforts by Program Activity – PGE2057

Program Component	Observations	Depth Interviews	Internet Surveys
Green Home Tours	1 observed in June 2008 in East Bay, CA; approximately 1,200 attendees	-	Conducted survey between March and April 2009 (n=195)
Councils	1 observed in December 2008 in Oakland, CA; 30-35 participants	-	Conducted survey between March and April 2009 (n=125)
Consultations	Observed 1 meeting in October 2008 in San Francisco, CA; 12 participants	Interviewed 8 participants between November 2008 and March 2009	-

One internet survey was tailored to attendees of the six BIG Green Home Tours with valid email addresses that occurred between January 2006 and December 2008. It focused on residents, as they are the primary target audience for the home tours. Opinion Dynamics also fielded an Internet survey to members of the six councils, tailoring questions to both policymakers and general market actors. Finally, we studied the reports from 24 consultation meetings[10] and chose eight projects where there was the most potential for energy savings through energy efficiency design and installation. We conducted a total of eight depth interviews, between November 2008 and March 2009, with participating builders and designers. Table 13 summarizes the population and sample frames across our primary data collection efforts.

Table 13: Summary of Population and Sample Frames – PGE2057

Target	Research Method	Population Size	Sample Size/ Frame	Completes
Green Home Tour Attendees	Internet Survey	Unknown, but at least 6,200	1,366	195
Councils Members	Internet Survey	2,069	1,748	125
Consultation Participants	Depth Interviews	24 projects; 152 attendees	8 projects	8

[10] These 24 consultations ranged from walk-thrus of existing buildings, to design charettes for new multifamily construction and remodeling. During these consultations BIG consultants made energy efficient and "green" recommendations.

4.7.3 Southern California Home Performance Program, SCE2548

The Opinion Dynamics evaluation team utilized secondary and primary data collection methods to answer the research questions and support the findings in this evaluation. Secondary data collection included a review of program materials, databases, quarterly reports, post training participant surveys, and past process evaluations.[11] For primary data collection, we observed one field training, conducted interviews with the participants in that training, conducted in-depth interviews with four participants, and fielded a quantitative telephone survey to participants. We note that we did not have access to a database of homeowners that worked with participating contractors to receive Home Performance assessments and retrofit projects. Project level data collection has been an ongoing challenge for the program due to issues with getting contractors to provide such data to the program.

A process evaluation for this program was conducted by Research Into Action for the same program cycle. We reviewed this process evaluation as part of our background research for this impact evaluation and coordinated with the process evaluation's data collection efforts to ensure that our data collection efforts did not overlap.

We observed one day of field training in October, 2008 in Costa Mesa, CA. Two trainers, two participants, and the homeowner were present for the entire day, while three other contractors visited throughout the day. The observer interviewed the participants, trainers, and homeowner at the end of the training. This observation allowed us to further explore what kind of implementation techniques and trainings the program accomplishes. The interviews helped us to understand participants' reactions to the training and likelihood to change behavior.

We conducted four in-depth interviews with program participants. These interviews took place in February 2009 with participants who attended trainings in 2007 or 2008. The interviews allowed us to obtain a better understanding of participants' experience with the program, including what they learned and what they applied.

We developed and fielded a telephone survey of program participants. The survey included a range of questions on awareness and knowledge of home performance techniques and elicited information about behavioral changes stemming from the program, including recommendations to homeowners and follow-through. We drew the sample from a list of participants provided by the program. We attempted to contact all participants and completed surveys with 52 out of 154 potential participants. Table 14 summarizes our primary data collection efforts.

[11] The process evaluation for Home Performance was undertaken by Research into Action as part of the *Process Evaluation of 2006-2008 IDEEA & InDEE Programs with Lessons for 2009-2011 Programs*, published September 9, 2009.

Table 14. Primary Data Collection Efforts by Program Activity – SCE2548

Program Component	Observations	Depth Interviews	Surveys
Training Course	1 day of field training observed in October 2008 in Costa Mesa, CA	Interviewed 4 program participants in February 2009; conducted interviews with 2 participants, 2 trainers, and 1 homeowner at end of field training in October 2008	Conducted phone survey in October 2009 (n=52)

Table 15 summarizes the population and sample frame across our primary data collection efforts.

Table 15. Summary of Population and Sample Frame – SCE2548

Target	Research Method	Population Size	Sample Size/ Frame	Completes
Training Course Participants	Phone survey	157	154	52

4.7.4 Time of Sale (TOS), SDGE3036

The Opinion Dynamics evaluation team utilized secondary and primary data collection methods to answer the research questions and support the findings in this evaluation. Secondary data collection included a review of program documents and databases. For primary data collection, we observed a realtor training session and fielded two Internet surveys, one aimed at realtors who attended program training seminars and the other aimed at homeowners who participated in the program by receiving a Home Energy Check Up report.

A process evaluation for this program was conducted by ECONorthwest for the same program cycle. This evaluation was published in February 2008 as part of the report titled "Process Evaluation of the SDG&E 2006-08 Residential Customer Programs." We reviewed this process evaluation as part of our background research for this impact evaluation and coordinated with the process evaluation's data collection efforts to ensure that our data collection efforts did not overlap.

We observed one realtor training session (of the 16 held) held on July 21, 2008, at the Prudential California Realty-Training Center in San Diego. The information was presented by a realtor, with 58 realtors attending[12]. The observation allowed us to further understand the program's content and how it intended to change the behavior of both realtors and homeowners.

We fielded an internet survey in March and April 2009 to realtors who completed a training session. We drew our sample from a database of all 406 attendees of the training sessions

[12] A total of 406 realtors were trained by the program throughout 2006-2008.

in SDG&E territory; the database included both EnergyWi$e Partners and non-partners[13]. This survey allowed us to identify realtors' level of knowledge gained, and, amongst those that became full partners after the training, how they changed behavior both in their own homes and in their interactions with homeowners.

We also fielded an Internet survey in September 2009 that targeted home buyers and sellers who received Home Energy Check Up reports between 2006 and 2008. The sample was drawn from the database of 3,238 unique participants. The available sample was decreased to 1,578 unique participants for this study after removing participants that were either part of survey efforts for the process evaluation or other SDG&E survey efforts. Our Internet survey allowed us to understand what changes homeowners made after the inspection, what actions homeowners took, and how much the program influenced them to take those actions.

We note that our primary research efforts did not include home inspectors, as the Process Evaluation collected data from inspectors, leaving very few available to interview for this Impact Evaluation. Furthermore, inspectors were not expected to produce any energy savings from this program as they did not receive energy efficiency education for themselves or gifted measures for their own homes like the realtors did. Instead, we focused our evaluation efforts on the homeowners and realtors, who could directly report savings from their homes.

Table 16 summarizes our primary data collection efforts by each of the program activities we examined.

Table 16. Primary Data Collection Efforts by Program Activity – SDGE3036

Program Component	Observations	Surveys
Home Energy Audits and Reports	--	Conducted internet survey in September 2009 (n=60)
Realtor Training	1 observation of Realtor training session in July 2008 in San Diego, CA; 58 realtors attending	Conducted internet survey in March and April 2009 (n=70)

Table 17 summarizes the population and sample frames across our primary data collection efforts.

[13] EnergyWi$e partner realtors decided to fully participate in the program after attending an introductory training session. These partners pledged to incorporate energy efficiency into their interactions with clients, recommended home inspectors to perform energy audits for clients and gave free direct install measures to clients. Non-partners attended the introductory training session but decided not to become EnergyWi$e partners.

Table 17. Summary of Population and Sample Frames – SDGE3036

Target	Research Method	Population Size	Sample Size/ Frame	Completes
Homeowners	Internet survey	3,238	1,292	60
Realtors	Internet survey	406	338	70

4.7.5 PACE Energy Efficient Ethnic Outreach Program, SCG3531

Opinion Dynamics utilized secondary and primary data collection methods to answer the research questions and support the findings in this evaluation. Secondary data collection included a review of program materials, databases, quarterly reports, and past process evaluations[14]. For primary data collection, we observed four booths at community events, conducted intercepts at those events, and fielded a telephone survey to participants in PACE booths and recipients of direct business outreach and/or seminars.

We observed four events in October and November 2008 that in combination targeted all four ethnicities, and we intercepted Hispanic, Chinese, and Vietnamese participants (Table 18). One team member observed each event, and was fluent in one or more of the languages spoken by the targeted ethnicities (Chinese, Vietnamese, Korean or Spanish). These observations allowed us to further explore what the program accomplishes at community events, who typically approaches the booths, and the level of interest in the information. The intercepts help to understand the potential impact of program efforts on participants' energy usage behavior.

Researchers observed the event attendees visiting the booths from 10-20 feet away, then approached individuals in the language they spoke at the booth and asked them to complete an intercept survey, in return for $5. The responses to the intercepts were translated into English and then analyzed.

Table 18. Event Observations and Intercepts – SCG3531

Community Event	Estimated Attendees	Groups Present	Target Group	Intercepts
Garden Grove Event (Garden Grove)	300-500	Korean, Vietnamese	Vietnamese	20 Vietnamese
Accessible City Expo (Los Angeles)	1,000-1,200	Hispanic	Hispanic	6 Spanish and 6 English
Magnolia Place Community Celebration (Los Angeles)	500	Hispanic	Hispanic	6 Spanish

[14] ECONorthwest conducted the process evaluation for PACE residential as part of the *Process Evaluation of the Southern California Gas 2006-2008 Residential Customer Programs Final Report*, published February 15, 2008. Opinion Dynamics Corporation conducted the process evaluation for PACE nonresidential as a subcontractor to KEMA for the *Process Evaluation of SoCalGas' 2006-2008 Non-Residential Programs*, published March 15, 2008.

Community Event	Estimated Attendees	Groups Present	Target Group	Intercepts
PACE Asian Business & Career Expo (Pasadena)	5,000	Chinese, Korean, Vietnamese	Chinese	5 Chinese and 12 English

The Opinion Dynamics evaluation team also developed and fielded a telephone survey in two of the languages reached by this program: Chinese and Vietnamese, which were the two languages most prominent in the program. Additionally, many of the program's participants could be identified in the program database as Chinese or Vietnamese, which allowed us to field the survey more appropriately. The survey included a range of questions on awareness and knowledge of energy efficiency, and elicited information about behavioral changes stemming from the program, including channeling into utility resource acquisition programs. We drew the sample from a list of residential and nonresidential participants provided by PACE,[15] and then drew a random sample from two strata based on the language of the participants. The residential participants in the sample attended one of 123 different community events that took place in 2007 and 2008. The nonresidential participants either attended a food service seminar or received outreach from PACE at their small businesses or at a community event during this same time frame. While the participant databases did not explicitly note the type of outreach received by each nonresidential participant, we estimate that half of nonresidential respondents attended a food service seminar while the other half received outreach[16]. We fielded the survey in May 2009.

Table 19. Telephone Interview Completes

Residential	Chinese	Vietnamese	Total
Total Participants	1,700	1,713	3,413
Completed Interviews	50	50	100
Nonresidential	Chinese	Vietnamese	Total
Total Participants	274	395	669
Completed Interviews	25	19	44

Note: PACE did not start tracking participants until December 2007, and over half of tracked participants are listed as other or blank for ethnicity; therefore these participant numbers are likely underestimates.

Table 20 summarizes our primary data collection efforts by each of the program activities we examined.

Table 20. Primary Data Collection Efforts by Program Activity – SCG3531

Program Component	Observations	Intercepts	Surveys
Chinese Outreach	1 community event with this group present in 2008 in Pasadena, CA	5 Chinese	Conducted phone survey in May 2009 (n=75)

[15] The numbers of participants and the number of events they attended do not total the number of participants or events reported by PACE. Additionally, we did not receive contact information for all participants.

[16] The participant database noted whether a nonresidential participant attended a seminar or received outreach. However, the nature of the outreach (whether it was at a booth event or received via a walk-in to the business) was not included.

Program Component	Observations	Intercepts	Surveys
Vietnamese Outreach	2 community events with this group present in 2008 in Garden Grove, CA and Pasadena, CA	20 Vietnamese	Conducted phone survey in May 2009 (n=69)
Hispanic Outreach	2 community events with this group present in 2008 in Los Angeles, CA	12 Spanish	--
Korean Outreach	2 community events with this group present in 2008 in Garden Grove, CA and Pasadena, CA	--	--

Table 21 summarizes the population and sample frames across our primary data collection efforts.

Table 21. Summary of Population and Sample Frames – SCG3531

Target	Research Method	Population Size	Sample Size/ Frame	Completes
Chinese Residential	Survey	1,700	992	50
Chinese Non Residential	Survey	274	180	25
Vietnamese Residential	Survey	1,713	1,012	50
Vietnamese Non Residential	Survey	395	275	19

4.7.6 Custom Language Efficiency Outreach Program (CLEO), SCG3532/SCE2513

Opinion Dynamics utilized secondary and primary data collection methods to answer the research questions and support the findings in this evaluation. Secondary data collection included a review of program materials, databases, quarterly reports and past process evaluations.[17] For primary data collection, we observed a community event and fielded a telephone survey to participants in the Chinese and Vietnamese seminars.

We observed one booth event, the Harvest Moon Festival, in Acadia County Park on September 14, 2008, to gain a better understanding of the program. This observation allowed us to further explore what the program accomplishes at community events, who typically approaches the booths, and the level of interest in the information.

We developed and fielded a telephone survey in the languages of the customers predominantly reached by this program (Chinese and Vietnamese). The survey included a range of questions on awareness and knowledge of energy efficiency and elicited

[17] We reviewed the process evaluation for CLEO, which was part of ECONorthwest's *Process Evaluation of the Southern California Gas 2006-2008 Residential Customer Programs Final Report*, published Feb. 15, 2008.

information about behavioral changes stemming from the program, including channeling into utility resource acquisition programs. The survey used a random sample from two strata based on the language of the participants. These participants attended several different seminars that took place in 2007 and 2008. We fielded the survey in May 2009.

Table 22 summarizes our primary data collection efforts by each of the program activities we examined.

Table 22. Primary Data Collection Efforts by Program Activity – SCG3532/SCE2513

Program Component	Observations	Surveys
Chinese Outreach	1 booth event observed in Sept 2008 in Acadia County Park, CA	Conducted telephone survey in May 2009 (n=50)
Vietnamese Outreach	--	Conducted telephone survey in May 2009 (n=50)

Table 23 summarizes the population and sample frames across our primary data collection efforts.

Table 23. Summary of Population and Sample Frames – SCG3532/SCE2513

Target	Research Method	Population Size	Sample Size/ Frame	Completes
Chinese	Telephone survey	1,900	1,556	50
Vietnamese	Telephone survey	760	574	50

4.7.7 Business Energy Assessment (BEA), SDGE3040

We utilized secondary and primary data collection methods to answer the research questions and support the findings in this evaluation. Secondary data collection included a review of program documents, program databases, and past evaluations[18]. Primary data collection included an Internet survey of participants.

Opinion Dynamics fielded an Internet survey of businesses that completed the assessment between May 2007 and December 2008. The program implementer provided the list of all assessment participants. Individuals who participated in the assessment prior to May 2007 were not contacted, since they may have participated in prior evaluation efforts. Therefore, the total number of participants that received an invitation to complete the Internet survey

[18] We reviewed the process evaluation for BEA, which KEMA conducted as part of the *Process Evaluation of SDG&E's 2006-2008 Non-Residential Energy Efficiency Programs,* published March 15, 2008.

(after removing individuals with invalid email addresses) was 857. Out of this attempted census of eligible respondents, 93 BEA participants completed the internet survey between March and April 2009.

Table 24 summarizes the population and sample frame across our primary data collection efforts.

Table 24. Summary of Population and Sample Frame – SDGE3040

Target	Research Method	Population Size	Sample Size/ Frame	Completes
Audit Participants	Internet survey	2,562	857	93

4.7.8 K-12 Energy Efficiency Evaluation, SDGE3032

Opinion Dynamics utilized multiple sources of data, secondary and primary, to build a chain of evidence for the program's energy and non-energy impacts. Secondary data collection included a review of program documents and curricula. For primary data collection, we collected our own data in conjunction with data collected by the program implementer. The program implementer fielded a number of surveys in consultation with the Opinion Dynamics team[19]. Throughout our evaluation, we had no reason to believe that the survey data collected by the program implementer are intentionally biased given that the program implementer did their best to field the surveys to every teacher and student possible and to share all of that data with us in a timely fashion. Quantitative surveys included a hard copy teacher training survey at the end of each training session, an electronic teacher curriculum survey after the teachers implemented the E3 curriculum in their classrooms and a mail-in survey of students and their families after students completed the program. For our own data collection efforts, we attended one of the 4th grade curriculum teacher trainings, observed a classroom receiving one of the lessons, and conducted a depth interview with the teacher immediately following our classroom observation. The following table shows the primary data collection efforts we used in this effort.

[19] Program implementers had a teacher curriculum evaluation survey in place before this evaluation began. Notably, Opinion Dynamics collaborated with the program implementers to create a new teacher curriculum evaluation survey to more effectively assess the potential energy and non-energy benefits of the program. This survey was not fielded in time to collect enough data (only two respondents) for analysis in this evaluation time period.

Table 25. Primary Data Collection Efforts

Opinion Dynamics Collected			Implementer Collected with Evaluation Team's input		
Teacher depth interview	Training Observation	Classroom Observation	Professional Development Training Survey	Teacher Curriculum Survey	Post-Program Student Household Survey
1 teacher provided in-depth feedback on the 4th grade curriculum in Nov 2008	Observed the 4th grade teacher training in Nov 2008 in San Diego, CA (14 teachers in attendance)	Observed a 4th grade classroom receiving curriculum in Dec 2008 in San Diego, CA (21 students in attendance)	243 teachers completed surveys after each training in 2008 (100% completion rate)	62 teachers completed a survey after teaching the E3 curriculum in schools (31% completion rate[20])	61 students mailed a survey after participating in the program (unknown completion rate[21])

4.7.9 Portfolio of the Future, SCG3530

The evaluation of POF is unique. This is due to the fact that Portfolio of the Future (POF) is classified as an information program but operates like the Statewide Emerging Technology Program (ETP). There is a different protocol for ETP, which we used to plan the evaluation of POF. The elements of each evaluation approach that are applied to POF were selected based on the evaluation team's understanding of the program at the outset of the evaluation. These elements were determined to be most relevant to the program and feasible to complete given the evaluation resources available.

Indirect Impact Methods

The evaluation team used the case study approach to understand the effectiveness of POF's approach relative to the goals that the program has established. In large part, the case study was used to describe the outcomes of the project rather than the process associated with the projects. The two case studies included analysis of information gathered from a variety of sources. Primary data collection included 12 depth interviews with POF project managers and program managers, SoCalGas staff involved with the project, and vendors whose technologies were examined in connection with the project. Secondary data collection included a review of POF's documentation for each project, of the program's periodic and final reports, and web research where appropriate. All of the information gathered for each project was then reviewed and analyzed to develop the case studies. Each case study is designed to highlight the unique aspects of the projects.

[20] The program database shows that 200 teachers participated in the program between 2006 and 2008. We based the teacher curriculum survey completion rate on 200 teachers. However, 243 teachers submitted surveys after each training. Teachers could have participated in multiple trainings and are double-counted in the professional development training survey data. Another explanation is that the program database may not include all of the program participants. Suggested additions to the program tracking database to decipher this discrepancy can be found in the "Evaluability Assessment" section of this report.

[21] Suggested additions to the program tracking database to compute this completion rate can be found in the "Evaluability Assessment" section of this report.

The evaluation team selected the projects for which the case studies would be prepared based on a practical set of criteria. The criteria were intended to help capture projects that exhibited some of the characteristics of information programs since the case study was intended, in large part, to document the information aspects of the program. The evaluation team used the following criteria to select the two projects for the case study:

- Projects have a Program Readiness Package (PRP) prepared;
- Projects include some type of field study or demonstration;
- Projects had not previously been the subject of a case study; and
- Project lead at Navigant still working for Navigant.

Table 26 demonstrates how the seven technologies for which Program Readiness Packages were prepared fit these criteria.

Table 26. Characteristics of Candidate Projects for Case Study

	PRP Prepared[a]	Field Study or Demonstration	Previous Case Study Prepared	Project Lead Still at Navigant?
Improved Commercial Dishwashers (Chosen for case study)	Yes	Yes[b]	No	Yes
Cold Water Enzymatic Detergent (Chosen for case study)	Yes	Yes	No	Yes
Spyrocor	Yes	Yes	No	No
Steam Trap Monitoring	Yes	Yes	Yes	Yes
Tunnel Washers	Yes	No	No	Yes
Laundry Wastewater Recycling	Yes	No	No	Yes
Low-Temperature Commercial Laundry Detergent	Yes	No	No	Yes

[a] Items underlined met our criteria for a possible case study.

[b] Note that the evaluation team discovered that Improved Commercial Dishwashers were on display at the SoCalGas Food Service Equipment Center during the in-depth interviews. This was not reported as a field demonstration as part of the POF documentation process.

Once the projects were selected, the evaluation team used a combination of methods to gather information for the case studies. We reviewed quarterly reports, the final report submitted by Navigant to SoCalGas, completed market studies, other memos prepared within the team, and the paper that was co-authored by Navigant and SoCalGas staff. The evaluation team also conducted a series of interviews for each case study. Interviewees included Navigant's lead for the project, the Energy Efficiency program manager appropriate

for the product, vendors of the product, and other market partners.

Methods from Emerging Technologies Protocol

A subset of ETP methods were selected in order to compare POF on some levels with its sister program, ETP. Table 27 reiterates the goals and identifies the methods from the evaluation of the Statewide ETP that were pursued in the evaluation of POF. It also includes a brief description of any alterations to those methods that are applied to the POF evaluation. Given the relatively smaller budget of POF and the need to assess the education and outreach components of this program, executing the full ETP methodology was not appropriate.

Table 27. Summary of Methods from ETP Protocols as Applied to POF

	ETP Method and Approach	Amendment to Approach for POF
Program Design Determine the extent to which POF, as currently designed, is capable of contributing to California's ability to meet its need for future energy efficiency technologies	Program Theory and Logic Model	High level description of program design; no new logic model developed
	Portfolio Evaluation	Data collected for all projects that had been pursued through market study or field study/demonstration Interview with one vendor out of eight (roughly the same percentage as for ETP), compared to 10 vendors out of 69
	Aggregate Analysis	Same as for ETP
Program Implementation Assess the effectiveness of POF program implementation, including the extent to which synergies with other market actors have been leveraged	Process Mapping	Not conducted
	Findings on Progress toward Recommendations in prior evaluation	Not applicable; this is the first evaluation cycle
	Assessment of nature and frequency of interactions with ETCC	Not conducted
	Stakeholder Interviews	Not conducted
	Case Studies	Focused on outcomes of program rather than on process
Program Impact Document the extent to which the short- and long-term goals of the program are being achieved, including which technologies assessed by POF have been transferred to EE programs	ETP Data Tracking	Not conducted
	ETP Technologies Transferred to EE Programs	Based on Self-report rather than on extensive search of EE program measure databases
	Peer Reviews	Not conducted

4.8 Engineering Analysis of Energy Savings

Baseline data for these Education and Information programs have no energy baseline as any energy savings are indirect and calculated using secondary information. The secondary data used in this assessment came from the sources shown in Table 28.

Table 28. Sources of Secondary Data for Energy Savings

Source	Percentage of Measures that Used this Source
eQUEST	49%
DEER	46%
Web Research	26%
Internal Estimates	21%
ENERGY STAR Calculator	15%
Engineering Calculations	8%

There were 39 measures with energy savings applied across the nine programs. Some had straightforward applications of DEER values while others required additional analysis and assumptions. Our analysis has created a database of the energy savings from many behaviors. Full details about the energy savings calculations and all measures where energy savings were applied are found in Appendix D.

5. RELIABILITY ASSESSMENT OF STUDY FINDINGS

As described previously, the evaluation employed a combination of quantitative and qualitative assessments. The actions taken to maximize reliability and validity (i.e., minimize bias) can vary based on the type of assessment. Determination of program impacts for this diverse set of programs is difficult to state with specific statistical certainty. Our evaluation captured discrete items with varying degrees of rigor and we discuss each of those items in this section.

For the collection of quantitative data through surveys by a Computer Aided Telephone Interview (CATI) both validity and reliability were addressed through multiple strategies. First, the experience of the evaluation team was used to create questions that, at face value, appear to measure the idea or construct that they are intended to measure. The questions were reviewed to assure that double-barrel questions (i.e., questions that ask about two subjects, but with only one response) and "loaded" questions (i.e., questions that are slanted one way or the other) were not asked. Scales were constructed so that multiple items (which increase reliability) were used to assess an underlying construct. The overall logical flow of the questions was checked so as not to confuse respondents and thereby decrease reliability. All drafts of the various survey instruments were reviewed by key members of the evaluation team as well as the CPUC and MECT. In addition, to determine if the wording of the questions is clear and unambiguous, we pre-tested each survey instrument and allowed the CPUC/MECT and team members to listen to the telephone interviews as they were being conducted or to review the first set of internet survey completions. We used the pretests to assess whether the length of the survey was reasonable and reduced questions as needed to keep all of our telephone surveys less than 20 minutes.

Reliability was assured through careful training of all CATI interviewers. All quantitative telephone interviews were conducted at ODC's Philadelphia-based telephone interviewing center. This facility allows us to ensure the highest quality results in our interviewing as we have:

- Full-time supervision and monitoring,
- Professional, experienced, interviewers and supervisors,
- Continuous, random monitoring of all telephone interviewers, and
- Verbatim recording of all open-ended responses as expressed by respondents

ODC interviewers go through a rigorous training period before they can begin interviewing. Staff members first receive a general background on what research is and the goals of ODC's telephone interviewing services. After the initial training on software, interviewers are then asked to make a number of timed, mock calls where they are trained to deal with different situations that arise when completing a call. This training period continues under a supervisor's direction until they are confident that the interviewer is ready.

All of our research services utilize proven protocol and quality control checks to guarantee dependable, high quality results. We carried out continuous, random monitoring of all telephone interviewers and validation of at least 10% of every interviewer's work.

We addressed ***construct validity*** through careful review of the data collection instruments as described above. Additionally, after completion of the survey, where multiple questions have been used to measure a single underlying construct, we performed statistical tests such as Cronbach's alpha, to measure how well a set of items (or variables) measures a single unidimensional latent construct.[22] This type of construct analysis occurred when we captured program influence through several questions.

We did not need to address ***statistical validity*** as no regression or other statistical models were used in the analyses that occurred.

We addressed ***internal validity*** for the programs through explanation building combined with our knowledge of the program implementation. We applied the Cognitive Change Index as the value representing the influence of the program (and as such, the causal factor in the savings provided).

For quantitative efforts, ***external validity*** (the ability to generalize to the population of interest), was enhanced through the use of an appropriate sample design. For the four data collection activities where this was an issue (see Table 8 for those with precision estimates), we used a random sample design. However, we note in previous sections that contact information was not available for parts of the populations touched by the programs. Additionally, in broad outreach programs, it is not possible to obtain a sample frame that is known to fully represent the population (as the population is unknowable). Therefore, we extrapolated our energy savings to larger populations based on how the population was sampled and did not always generalize our savings to the population touched by the programs.

We summarize the entire data collection efforts of this study and how bias was minimized using the first six specific areas of potential bias and uncertainty as outlined in the Protocols and further described in the California Framework[23]. (Table 29).

[22] Cronbach's alpha can be written as a function of the number of test items and the average inter-correlation among the items. Below, for expository purposes, we show the formula for the standardized Cronbach's alpha:

$$\partial = \frac{N \times \bar{r}}{1 + (N-1) \times \bar{r}}$$

Here N is equal to the number of items and r-bar is the average inter-item correlation among the items.

[23] TecMarket Works. 2004. The California Evaluation Framework. June.

Table 29. How Study Addressed Potential Bias and Uncertainty

Potential Sources of Bias	CATI Telephone Survey	Online Survey
Non-response and other forms of selection bias	Respondents were called at different times of the day and on different days.	The entire sample frame was included and email follow up reminders were provided for all.
Measurement error and Response Bias	Careful design and review of survey, pre-testing. Where multiple items were provide for choice, their ordered was randomly changed.	
Erroneous specification of the statistical model	This potential source of bias comes into play when a regression is used in the analysis. This is not applicable for these efforts.	
Choosing an inappropriate (energy) baseline	Not applicable as secondary sources of information were used to calculate energy savings.	
Self-selection of program participants	In energy efficiency assessments, often self-selection bias shows up in the estimation of free-ridership when non-participants are a comparison group. No non-participants are included in the calculation of influence of the programs in any of our efforts.	
Misinterpretation of association as causal effects.	This potential source of bias comes into play when a regression is used in the analysis. This is not applicable for these efforts	

6. EDUCATION AND INFORMATION PROGRAM VERIFICATION

In this section, we present our study findings from the 19 Education and Information programs that were assessed for verification purposes. Detailed information for each of these programs can be found in Volume II.

6.1.1 Program Costs and Achievements

This indirect impact evaluation included 19 programs classified as Education and Information programs. The programs were implemented in the four major CA IOU territories: 7 programs in SDG&E territory, 5 SCE programs, 2 PG&E programs, 4 SCG programs and 1 program in SCE and SCG territories. All of these programs were implemented by third party contractors[24]. As shown in Table 30, overall spending on these programs between 2006 and 2008 totaled $21.9 million. Program-specific expenditures ranged from a low of $356 to a high of $3 million.

Information is separated into the programs continuing or not into the 2010-2012 program cycle. For those programs not continuing, we did not investigate why the program was discontinued.

[24] One exception is the Energy Efficiency Delivery Channel Innovation Program (SCG3504) which was implemented by SCG.

Table 30. Summary of 2006-2008 Education and Information Program Budget and Expenditures

	Program Implementer	Percent of Total Overall Ed & Info Budget	Individual Program Budgets (2006-2008)	Program Expenditures (2006-2008)	Percent of Individual Program Budget Spent
Programs continuing into 2010-2012					
PACE Energy Efficient Ethnic Outreach (SCG3531)	Pacific Asian Consortium in Employment	12%	$ 2,915,629	$3,037,863	104%
Portfolio for the Future (SCG3530)	Navigant Consulting	12%	$ 2,905,000	$2,492,237	86%
K-12 Energy Efficiency Education (SDGE3032)	SD County Office of Education	8%	$1,936,583	$1,992,401	103%
Build It Green (PGE2057)[a]	Build It Green	7%	$1,668,918	$1,735,003	104%
Builder Energy Code Training (PGE2044)	ConSol	6%	$1,427,033	$1,548,426	109%
Southern California Home Performance (SCE2548)	Bevilacqua-Knight	6%	$1,333,851	$1,409,355	106%
Custom Language Efficiency Outreach (SCG3532/SCE2513)[b]	Global Energy Services	6%	$1,464,051	$1,345,927	92%
Business Energy Assessment (SDGE3040)	EnVinta	2%	$599,347	$634,864	106%
Total Continuing Programs	–	–	***$14,250,412***	***$14,196,076***	–
Programs no longer continuing into 2010-2012					
Energy Efficiency Delivery Channel Innovation Program (SCG3504)	Southern California Gas Company	12%	$3,000,000	$2,687,973	90%
Time of Sale Energy Check-Up (SDGE3036)	GeoPraxis	6%	$1,471,987	$1,100,711	75%
Aggregation of Housing Agencies (SCE2547)	Strategic Energy Innovations	6%	$1,363,569	$948,575	70%
Energy Efficiency Kiosk Pilot Program (SCG3529)	Intergy	4%	$900,000	$681,360	76%
E-mail Based Energy Efficiency Program (SCE2545)[c]	Nexus	2%	$600,000	$593,264	99%
Affordable Housing EE Alliance (SCE2542)[c]	Heschong Mahone Group	2%	$522,362	$591,467	113%

	Program Implementer	Percent of Total Overall Ed & Info Budget	Individual Program Budgets (2006-2008)	Program Expenditures (2006-2008)	Percent of Individual Program Budget Spent
Advanced Home Renovation Program (SDGE3031)	RHA	2%	$456,805	$461,678	101%
Sweetwater Schools Demonstration (SDGE3037)	Intergy; Sweetwater Union High School District	1%	$249,800	$270,614	108%
Industrial Energy Efficiency Acceleration (SDGE3033)	EnVinta	3%	$724,986	$241,572	33%
One-2-Five Energy Program (SCE2540)[c]	EnVinta	2%	$500,000	$167,069	33%
CHEERS New Construction (SDGE3041) [c]	CHEERS	1%	$179,000	$356	<1%
Total Discontinued Programs	–	--	*$9,968,509*	*$7,744,639*	--
Total Education and Information Programs	–	**100%**	**$24,218,921**	**$21,840,715**	**91%**

Note: Some programs received additional funding for activities beyond the CPUC Public Goods Funding.
[a]The Build It Green Program estimated that the CPUC funds represented 20% of the entire budget for activities.
[b]Total program expenditures and budgets for the Custom Language Efficiency Outreach program is an estimate. SCG tracked its budget and expenditures for this program but SCE reported the budget and expenditures separately as part of all of its overall $23 Million+ Educational and Training Budget.
[c] This program was not implemented for the entire PY2006-2008.

The performance metrics, or goals, defined by each program differed greatly across all programs. One common theme across the programs is that their metrics primarily focused on accomplishments such as the number of trainings conducted or the number of events conducted rather than energy saving goals. One exception is the Southern California Home Performance program which did set an explicit goal for energy savings, although it was not required to set or meet this goal since it was classified as an Education and Information program. As shown in Table 31 below, across the 19 programs, 11 met almost all of their goals or exceeded them, 2 only met some goals, 2 fell short of meeting their goals and 4 programs were discontinued before the program cycle ended.

The PACE Energy Savings Project (PACE, SCG3531) and the Aggregation of Housing Agencies (AHA, SCE2542) programs are classified as only meeting some of their goals. The PACE program actually exceeded its goals for outreach to businesses and community events. It planned to provide outreach to 3,376 small businesses and was able to reach out to 3,461. It also planned to conduct 103 ethnic community events and conducted 124. However, it fell short of its goal for the number of HEES surveys completed (2,239 out of a planned 7,000) and just slightly short of its goal for the number of residential customers reached (13,227 out of a planned 15,000). The PACE program primarily fell short of its HEES survey goal because the website that was supposed to serve as a portal to the HEES was not available until almost the third year of the program's implementation. The AHA program exceeded its goal for the number of aggregations but fell short of its goal for the number of housing agencies educated and the number of housing agencies that initiated retrofit projects. The AHA program was discontinued at the end of 2008.

The K-12 Energy Efficiency Education (K-12 SDGE3032) and Industrial Energy Efficiency Acceleration (IEEA SDGE3033) programs are noted as falling short of meeting their goals. The K-12 program drastically fell short of its goal to reach 400,000 students. This number is almost the entire K-12 student population in SDG&E territory and was an unrealistic goal set by the program for its' first 3-year program cycle. Due to its long development process, the program only reached approximately 12,000 students across all grades by the end of the PY2008. Much of the 3-year program cycle was spent developing energy-efficiency curriculum and supporting educational materials for the students that was compliant with California Science Standards. The time involved in developing and gaining approval for such curriculum, recruiting and training teachers, and incorporating the curriculum into a year's lesson plan all prevented the program from reaching this goal. The IEEA program provided energy management advice and support for large energy users in the manufacturing and industrial sectors. The IEEA program consisted of two stages. Stage One was a one-day session involving a management diagnostic session and a technical site audit. The program's goal was to recruit 40 participants in Stage One but it only recruited 11. Stage Two provided coaching and training services to implement the action plans created in Stage One. The program's goal was to recruit 10 participants in Stage Two but it only recruited 2. The IEEA program was discontinued at the end of 2008.

Four programs fell short of their goals because they were discontinued in the PY2006-2008 cycle: CHEERS New Construction (SDGE3041), One-to-Five Energy (SCE2540), Email Based Energy Efficiency (SCE2545) and the Affordable Housing EE Alliance programs (SCE2542).

Table 31. 2006-2008 Education and Information Program Goals and Accomplishment Status

Program	Program Expenditures (2006-2008)	Primary Goals (2006-2008)	Accomplishment Status (2006-2008)			
			Mostly Met/ Exceeded	Some Met	Fell Short	Dis-continued In Program Cycle
Programs continuing into 2010-2012						
Portfolio for the Future (SCG3530)	$2,492,237	Review current and emerging energy efficiency technologies and practices to determine what should be included SCG's 2009-2011 portfolio of sponsored efficiency programs	x			
Build It Green (PGE2057)	$1,735,003	24 projects consultations; 62 workshops; 6 green home tours; >2,000 staff hours for council support	x			
Builder Energy Code Training (PGE2044)	$1,548,426	104 classroom trainings; 52 on-site trainings	x			
Southern California Home Performance (SCE2548)	$1,409,355	8 training sessions; 4 business & marketing sessions; 150 trained participants; 2,000 MWh, 2,000 kW	x			
Custom Language Efficiency Outreach (SCG3532/SCE2513)	$1,345,927	75 in-language seminars; 15 booth events, 2K HEES completes	x			
Business Energy Assessment (SDGE3040)	$634,864	2,000 completed assessments	x			
PACE Energy Savings Project (SCG3531)	$3,037,863	Outreach to 3,376 small businesses; 103 community events; 7K HEES completes; Outreach to 15K residents		x		
K-12 Energy Efficiency Education (SDGE3032)	$1,992,401	Reach 400,000 students			x	
Total Continuing Programs	**$14,196,076.00**	–	**6**	**1**	**1**	**0**
Programs no longer continuing into 2010-2012						
Energy Efficiency Delivery Channel Innovation Program (SCG3504)	$2,687,973	32,000 visits to SCG energy efficiency website, 340 media placements 80 business outreach events; 120 residential outreach events	x			

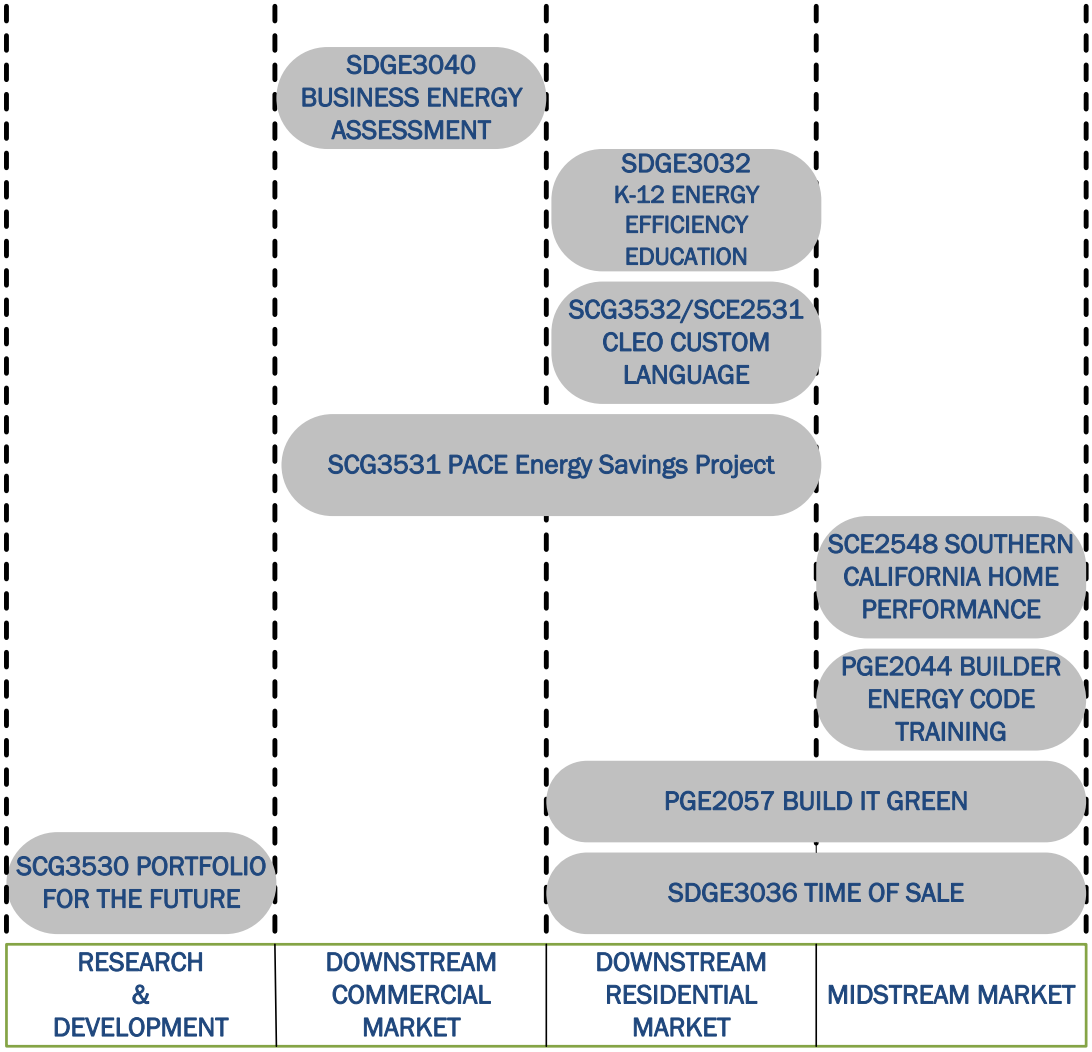
Program	Program Expenditures (2006-2008)	Primary Goals (2006-2008)	Accomplishment Status (2006-2008)			
			Mostly Met/ Exceeded	Some Met	Fell Short	Dis-continued In Program Cycle
Time of Sale Energy Check-Up (SDGE3036)	$1,100,711	Train 500 realtors; train 85 home inspectors; complete 3,000 home energy reports	x			
Energy Efficiency Kiosk Pilot Program (SCG3529)	$681,360	Install 20 kiosks; reach 500 customers	x			
Advanced Home Renovation Program (SDGE3031)	$461,678	Install measures in demonstration home; host 4 open house events; calculate before/after energy use	x			
Sweetwater Schools Demonstration (SDGE3037)	$270,614	Install 226 Retrolux lighting systems and 9 OASys cooling systems; hold 8 community events	x			
Aggregation of Housing Agencies (SCE2547)	$948,575	4 aggregations; work with 75 housing agencies; 7.05 million kWh energy savings		x		
Industrial Energy Efficiency Acceleration (SDGE3033)	$241,572	40 Stage One participants, 10 Stage Two participants			x	
E-mail Based Energy Efficiency Program (SCE2545)	$593,264	250,000 subscriptions; 3% or higher overall energy savings				x
Affordable Housing EE Alliance (SCE2542)	$591,467	15 workshops/trainings/presentations; 32 meetings; 20 design charettes				x
One-2-Five Energy Program (SCE2540)	$167,069	30 Stage One participants, 5 Stage Two participants				x
CHEERS New Construction (SDGE3041)	$356	Develop and implement software changes to EnergyPro and CHEERS registry				x
Total Discontinued Programs	**$7,744,639.00**	–	**5**	**1**	**1**	**4**
Overall Total	**$21,940,715**	--	**11**	**2**	**2**	**4**

7. PROGRAM REACH & INTENSITY

The Commission selected nine Education and Information programs to evaluate for energy and non-energy impacts given that these programs were planned to continue into the 2010-2012 program cycle[25]. While we originally grouped the programs by broad evaluation clusters, categorizing them by target markets leads to greater understanding of the value of each program. As such, we categorize the nine indirect impact assessed programs by the target markets they reached; i.e. downstream residential, downstream commercial, midstream or new product development. Figure 1 shows the markets that each of the nine programs intended to reach. Some of these nine programs played a role in the downstream market, targeting commercial end-users and/or residential end-users. Other programs played a role in the mid-stream market, targeting market actors and policy advocates with the goal of putting mid-stream market actors in a position to teach and encourage residential and commercial end-users to take action to save energy. Finally, one of these programs played an important role prior to full market acceptance, in the new product development stage, by conducting the research necessary for new energy efficient emerging technologies to move into a resource acquisition program. As shown in the figure below we found that some programs reached multiple market segments.

[25] One exception to this is the SDGE3036 Time of Sale Energy Efficiency Check Up Program. This program was discontinued at the end of 2008 but was still evaluated for energy impacts as it was determined to be informative for other future program efforts.

Figure 1. Target Markets for Education and Information Programs



In this section, we present overarching reach and intensity findings from the nine programs that were assessed for program impacts. The potential impact of Education and Information programs is dictated by multiple factors including, but not limited to, the number of people that each program is able reach, the information provided and the method in which the information is provided. As such, to understand the effects of these programs, we first examined the reach of each program and the intensity of the participants' interaction with the program. The intensity is the depth and extent of substantive, actionable information provided to the participants by each program.

Reach and Intensity

The reach of program components varies greatly, from 157 to 18,000+ individuals. The intensity of the information provided also varies greatly; however, these Education and Information programs often show an inverse relationship between reach and intensity. While some programs may appear to have reached a large number of participants, the educational method may have only touched a participant for 5 minutes, which may be sufficient to relay

general ways to save energy. In other cases where the programs may appear to have reached a small number of participants, the educational method was more intense as it provided information over a longer period of interaction time. For example, to juxtapose two programs that reached out to similar audiences, the Custom Language Energy Efficiency and Outreach Program (CLEO) in SCG and SCE territories reached 6,502 ethnic residential customers while the Pacific Asian Consortium in Employment Energy Savings Project (PACE) in SCG territory reached 13,227 ethnic residential customers. As shown in the descriptions below, the CLEO program provided a much deeper level of information to the residential market than PACE.

> SCG3532/SCE2531 CLEO Custom Language: Residents participate in in-language seminars lasting up to two hours. CLEO uses a PowerPoint presentation to offer a wide range of information about energy saving opportunities across all areas of the home: lighting, heating, air conditioning, water heating, appliances, and pools/spas. These energy saving tips include a wide range of high-cost and low-cost measures. The presentation describes the various rebates and savings available from SCE and SCG, including low income assistance programs. For each program, CLEO discusses the value of the rebate as well as some information about how to qualify. In addition, seminar participants are encouraged to take a five-minute version of the Home Energy Efficiency Survey (in-language).
>
> SCG3531 PACE Energy Savings Project: Residents stop by booths at community events where PACE recommends participation in available IOU rebate programs, installation of energy efficiency appliances and technology (including thermostats, showerheads, and aerators), and simple energy saving behavior changes (such as turning off lights) by asking people to complete a 5-minutes version of the Home Energy Efficiency Survey (in-language).

Table 32 below summarizes the reach, intensity, target market, and program component (or education method) for each of the nine Education and Information programs (starting with the program with the smallest verified reach). Most of these programs offered a high level of intensity or depth of information but reached a small number of participants. A more in-depth analysis of the reach and intensity for each of the nine programs provides is in the Program-by-Program chapters in Volume II of this report.

Table 32. 2006-2008 Education and Information Program Reach & Intensity

(Organized from smallest to largest Total Verified Program Reach)

Program	Target Market	Program Component	Reach Intensity	Verified Reach Numbers By Program Component	Total Verified Reach By Program
Southern California Home Performance (SCE2548)	Remodeling Contractors and Energy Consultants	Classroom and field training	HIGH	157	157
Builder Energy Code Training (PGE2044)	Builders & Code Officials	Classroom and field training	HIGH	1,978	1,978
Business Energy Assessment (SDGE3040)	Small and Mid-Size Businesses	15 minute Online Energy Audit & Report	MED	2,562	2,562
Time of Sale Energy Check-Up (SDGE3036)	Realtors	One-hour training	HIGH	406	3,644
	Residential Homeowners at Time of Home Sale	Online Energy Audit Report	MED	3,238	
Custom Language Efficiency Outreach (SCG3532/SCE2513)	Ethnic Residential	Mainly Seminars (2 hour interactive presentations) and some booth events, free measure give-aways	HIGH	6,502	6,502
Build It Green (PGE2057)	Builders and Residents	Technical support for residential building projects	HIGH	152	6,683
	Market Actors	Councils/Presentations and workshops	HIGH	2,069	

Program	Target Market	Program Component	Reach Intensity	Verified Reach Numbers By Program Component	Total Verified Reach By Program
	Residents	Green Home Tours/ In-home demonstrations of energy efficient products/measures	HIGH	4,464	
K-12 Energy Efficiency Education (SDGE3032)	K-12 students	Classroom curriculum (5 lessons)	HIGH	12,116	12,116
PACE Energy Efficient Ethnic Outreach (SCG3531)	Ethnic Residential & Commercial	Mainly booth events (mostly 5-minute interactions), some seminars, free measure give-aways	LOW	13,227	18,062
	Ethnic Commercial	Walk-in to businesses, free measure give-aways	HIGH	4,835	
Portfolio for the Future (SCG3530)	Product Vendors; Utility Staff; Study participants; Energy Industry Professionals	The program scanned, screened and researched emerging technologies, the results of which provided information regarding new technologies' functionality, drawbacks and market potential. Relative to other programs, this program reaches a small number of people in terms of actively interacting with others, but it has the potential to affect many others through moving specific measures into the SCG resource acquisition portfolio.			

Ripple Effect in the Residential and Commercial Markets

Education and Information programs targeting residential and commercial customers tend to have a ripple effect in the market, i.e., the information is often shared with the direct participants' sphere of influence including friends, family and colleagues. Therefore, the reach of these programs extends beyond the number of direct program participants. Table 33 below shows the percentage of direct residential participants that shared program information with others. The K-12 program shows the strongest ripple effect with 93% of students saying they shared information learned in the classroom with their families at home while the Time of Sale program shows the weakest ripple effect with only 53% of homeowners saying they shared information they received from the home energy audit with others. Note that this is presented by the percentages who shared information, not total number or the energy saving impacts of this communication.[26] Additionally, while 53% sharing information is the lowest in our assessment, it is still considered a high level of information sharing.

Table 33. Percentage of Residential Survey Respondents Who Shared Program Information with Others

Program	Education Method	Residential Market Segment	Ripple Effect (% Shared Program Information with Others)
K-12 Energy Efficiency Education (SDGE3032)	K-12 Curriculum	Under 18 years of age	93%
Build It Green (PGE2057)	Green Home Tour	General Residential	89%
Custom Language Efficiency Outreach (SCG3532/SCE2513)	2-hour seminars	Chinese and Vietnamese Residential	66%
PACE Energy Efficient Ethnic Outreach (SCG3531)	Brief booth interaction	Chinese and Vietnamese Residential	66%
Time of Sale Energy Check-Up (SDGE3036)	Audit at Time of Home Sale	General Residential	53%

Table 34 shows the ripple effect generated from the programs that directly targeted commercial customers. The Business Energy Assessment program shows a ripple effect with 73% of audit-takers saying they shared audit information with others in their company while the PACE program shows 55% of direct participants saying they shared PACE information with others.

[26] This was beyond the scope of this evaluation effort but should be considered for future efforts.

Table 34. Percentage of Commercial Survey Respondents Who Shared Program Information with Others

Program	Commercial Market Segment	Education Method	Shared Program Information with Others
Business Energy Assessment (SDGE3040)	Small and medium-sized businesses	Online Audit	75%
PACE Energy Efficient Ethnic Outreach (SCG3531)	Chinese and Vietnamese Commercial	Business walk-in presentation	55%

Multiplier Effect in the Mid-stream Market

Education and Information programs targeting mid-stream market actors also have a multiplier effect in the market, i.e., the information is often transferred to the market actors' clients and the mid-stream market actors have the potential to influence energy use in many buildings. Therefore, the reach of these programs greatly extends beyond the number of direct mid-stream participants into the residential and commercial segments they serve. We discuss the multiplier effect for each of the programs that targeted mid-stream market actors below.

PGE2044 Builder Energy Code Training: The program directly reached 1,978 participants; including code official and builders. The program reached builders that construct homes on a large scale; survey results showed that on average, a participating builder might construct up to 275 homes per year. Further, the program is reaching code officials that inspect a large number of homes per year. On average, a participating code official might inspect up to 300 homes per year. Given these large numbers, the program has the ability to impact the energy consumption of a significant number of new residential homes in PG&E territory. Between 2006 and 2008, 209,491[27] new homes were constructed in the state of California. Assuming that PG&E comprises roughly 40% of the new homes in the state, this program has the potential to impact up to 83,000 newly built homes.

SCE2548 Southern California Home Performance: The program directly reached 157 remodeling contractors representing 112 different remodeling companies. Based on survey results, we estimate that this program had the potential to influence the energy consumption of at least 5,000 homes annually.

SDGE3036 Time of Sale: The program directly reached 406 realtors during its energy efficiency and program trainings. These realtors sell eight homes on average per year. Therefore, this program had the potential to influence the energy efficiency of at least 3,000 homes in the San Diego area annually.

PGE2057 Build It Green: The program directly reached 2,069 market actors through its efforts supporting Councils and Guilds. The market actors included

[27] Data represents new permits. Data collected from the Construction Industry Research Board (CIRB)

builders, realtors and policy-makers. The information BIG provided to market actors also reached the market actors' pool of customers and colleagues; however the exact number is unknown.

8. KNOWLEDGE CHANGE BY PROGRAM AND MARKET

The programs are making changes in what people know. Below we discuss our overarching findings with regard to self-reported knowledge increase generated from this group of Education and Information programs. We present our findings by each of the three segments: the residential market, commercial market and midstream market[28].

Knowledge Impact on the Residential Market

A summary of the participants reporting very large energy efficiency knowledge increases across all programs that targeted the residential market is provided in Table 35, and ranges from a high of 60% among PACE participants to a low of 38% among Time of Sale participants.

Notably, the ability to increase energy efficiency knowledge is affected, at minimum, by a combination of the program information, the education or delivery method for that information and the participants' previous energy efficiency knowledge. For example, while 41% of residents that participated in the Green Home Tours said the information greatly increased their energy efficiency knowledge, many of these participants stated they were already very knowledgeable of energy efficiency prior to the Tour which limited the program's ability to greatly increase participant knowledge. Further, the higher knowledge (and behavior impact as described in the next section) of the CLEO and PACE programs may be in part due the delivery method but also due to the linguistically isolated nature of these populations where little information had previously been provided. The combination of these factors is discussed in depth for each program in Volume II of this report.

Table 35. Downstream Residential Market Knowledge and Behavior Impacts

Program	Education Method	Residential Market Segment	% Reported a Very Large EE Knowledge Increase[29]
PACE Energy Efficient Ethnic Outreach (SCG3531)	Brief booth interaction	Chinese and Vietnamese Residential	60%
Custom Language Efficiency Outreach (SCG3532/SCE2513)	2-hour seminars	Chinese and Vietnamese Residential	52%

[28] Notably, the Portfolio for the Future program was a unique program in this group. We note that the methods used for evaluating this program were very different from the other programs. Because of the near identical nature of this program and the statewide Emerging Technologies Program (ETP), we chose to follow the protocols for emerging technologies. Details on the indirect impact findings from this program can be found in the Portolio for the Future program chapter in Volume II of this report.

[29] Gave a 6 or 7 rating on a 7-point scale

Program	Education Method	Residential Market Segment	% Reported a Very Large EE Knowledge Increase[29]
Build It Green (PGE2057)	Green Home Tour	General Residential	41%
Time of Sale Energy Check-Up (SDGE3036)	Audit at Time of Home Sale	General Residential	38%
K-12 Energy Efficiency Education (SDGE3032)	K-12 Curriculum	Under 18 years of age	Qualitatively Assessed: Determined Very Likely to Increase Knowledge

A summary of the knowledge imparted by the programs is described below:

- **SCG3531 PACE Energy Savings Project**: The PACE program educated the Vietnamese, Chinese, Korean and Hispanic speaking residential market primarily through outreach booths at community events and HEES surveys. Participants learned about upgrades they could implement in the home to make it more energy efficient, including appliances, HVAC and building shell measures and rebate programs available to them. Participants also learned about energy efficiency from receiving direct install items including faucet aerators and low-flow showerheads.
- **SCG3532/SCE2531 CLEO Custom Language**: The CLEO program educated the Vietnamese, Indian, Chinese, and Korean speaking residential market through in-language collateral, 2-hour long seminars, HEES surveys and booth events. Participants learned about upgrades they could implement in the home to make it more energy efficient, including appliances, HVAC and building shell measures and rebate programs available to them. Participants also learned about energy efficiency from receiving free items to install including CFL bulbs.
- **PGE2057 Build it Green**: The Build it Green Program educated the residential market directly through Green Home Tours. Participants learn about energy efficiency measures by touring homes that demonstrate energy efficient options in a real home setting, getting 'hands-on' experience with green technology options and receiving one-on-one education provided by the homeowner, architect and/or builder each home. Furthermore, participants learn about the resources they need to take action on the products and features they see in each home by receiving a list of local and regional green building resources.
- **SDGE3036 Time of Sale:** The Time of Sale program educated the residential market through (1) One-on-one conversation between realtors and home buyers and sellers; and (2) An online Home Energy Check-Up report outlining the results of a home energy audit; which was produced by home inspectors after the inspectors conducted an on-site energy audit of a home in addition to a standard home inspection.

Participants learned about upgrades they could implement in the home to make it more energy efficient, including appliances, HVAC and building shell measures and rebate programs available to them. Participants also learned about energy efficiency from receiving free items to install including CFL bulbs, faucet aerators and low-flow showerheads.

- **SDGE3032 K-12 Energy Efficiency Education (E3):** We also examined knowledge impacts from the K-12 E3 program, a curriculum-based program that provided energy education and energy conservation information to K-12 students in the SDG&E service territory. Though the final design of the program is likely to positively influence students' energy behaviors, several evaluation challenges prevented our team from assessing its impact on knowledge in a manner similar to the other Education and Information programs. These challenges and the outcome of our evaluation are detailed the program chapter included in Volume II of this report.[30] However, we found that after a qualitative assessment of the curriculum developed for this program, an observation of a 4th grade class receiving the curriculum, and teacher interviews, this program is likely to increase knowledge and awareness for several reasons. First, it uses many hands-on activities that are more likely to stand out in students' minds than textbook-only lessons. Second, it explains new concepts, especially energy efficiency and conservation, likely not specifically taught in other classes in San Diego. Finally, the program has curriculum that is appropriate for each grade level, training that sufficiently prepares teachers to instruct the lessons, and students that appear engaged in the material.

Knowledge Impact on the Commercial Market

The knowledge impacts within the commercial market ranges from a high of 63% among PACE participants to a low of 24% among Business Energy Assessment participants.

Table 36. Downstream Commercial Market Knowledge and Behavior Impacts

Program	Commercial Market Segment	Education Method	% Reported a Very Large EE Knowledge Increase[31]
PACE Energy Efficient Ethnic Outreach (SCG3531)	Chinese and Vietnamese Commercial	Business walk-in presentation	63%
Business Energy Assessment (SDGE3040)	Small and medium-sized businesses	Online Audit	24%

A summary of the knowledge imparted by the programs is described below:

[30] Per knowledge impacts, these impacts are best assessed in this type of program through a pre and post survey of students. This survey is best fielded as part of the program's implementation itself. While the program was unable to include this type of pre and post survey during the PY2006-2008 time period of our evaluation, we strongly encourage the program to implement this type of survey to assist with future evaluations.

[31] Gave a 6 or 7 rating on a 7-point scale

- SCG3531 PACE Energy Savings Project: The PACE program educated the Chinese, Korean and Hispanic speaking market directly by walking into businesses and presenting energy efficiency information and through translated seminars, such as food service seminars. Participants learned about general ways to save energy in their business, either through behavior changes or through replacing measures such as lighting and refrigerators. Participants also learned about rebate programs available.
- SDGE3040 Business Energy Assessment: The BEA program educated small and medium sized businesses on ways to make their businesses more energy efficient through customize energy action plans. Participants learned about their businesses' energy consumption by completing a 10-15 minute audit for their business. Participants then learned about specific ways to save energy in their business and rebate programs available after receiving a customized action plan. Participants learned about both energy saving measures they could install and behavior changes they could make.

Knowledge Impact On the Midstream Market

Four of the nine Education and Information programs impacted energy efficiency knowledge by varying degrees in the midstream market actors.

- PGE2044 Builder Energy Code Training: BECT program participants learn about Title 24 Building Energy Efficiency Standard changes, both in-classroom and on construction sites. Title 24 changes went into effect on October 1, 2005. Consequently, the building and code official community needs to learn about how changes will affect them. Amongst builder participants, 73% received new information from the training regarding the Title 24 code and 23% said their knowledge of Title 24 code greatly increased after the training. Amongst code official participants, 70% received new information from the training regarding the Title 24 code and 32% said their knowledge of Title 24 code greatly increased after the training.
- PGE2057 Build it Green: The Build it Green Program reached out to market actors and policy-makers through its creation and facilitation[32] of six councils. The program provides the councils with an array of administrative services,[33] access to the knowledge and expertise of BIG program staff and consultants, and updates to relevant developments in the green market or green policy. The program formed these councils to help it distribute green building information, most of which is based upon the GreenPoint Rating system. Five of the councils are comprised of general market actors: including builders, real estate professionals, building suppliers,

[32] An interview with the program's Development Director clarified that the program was "instrumental in creating every guild and council in every chapter except for the East Bay chapter of Green Building," which the program has nevertheless "influenced heavily since" its independent inception. Some council and guild chapters were established by the program before PY2006-08, yet all were supported by the program during PY2006-08.

[33] Administrative services include general organizational support such as reserving meeting space, arranging speakers, providing refreshments, etc.

architects, engineers, and proponents of affordable residential buildings. Council members meet several times throughout a given year and learn about the GreenPoint Rating system, changes happening in the green building marketplace and energy policy changes. Amongst market actor council members, 48% reported that the program information greatly increased their knowledge of energy efficiency. Amongst Public Agency council members, a council that focuses on influencing energy policies, 39% reported that the program information greatly increased their knowledge of energy efficiency.

- **SCE2548 Southern California Home Performance:** Participants in the Southern California Home Performance program learn how to sell and conduct comprehensive home performance assessments in classroom and field training. As a result of the training, participants are able to diagnose the energy efficiency of homes install energy efficiency improvements. Among participants in this training course, 79% said their knowledge of energy efficiency greatly increased due to the training.
- **SDGE3036 Time of Sale:** Realtors participating in the Time of Sale program learn basic facts about energy efficiency in the home through an hour-long introductory training session. Among realtors that attended these training sessions, 40% said their knowledge of energy efficiency greatly increased due to the training.

So far, the assessments have shown that the programs are reaching their targeted markets and making changes in what those people know. The theory is that once knowledge is changed, there will be subsequent changes in the behaviors of people as they have learned that there are ways to help them save energy and money. The next section shows the resulting changes in actions by program participants.

9. BEHAVIOR CHANGE BY PROGRAM AND MARKET

This section discusses the energy saving actions induced by the Education and Information programs. By analyzing the sheer number of measures installed, not the energy savings associated with those measures, we found that CFLs, programmable thermostats and duct replacements were the most prevalent measures installed after receiving information from these types of programs. Below we discuss our overarching findings with regard to behavior change generated from this group of Education and Information programs. We present our findings by each of the two segments: the residential market (behavior change induced through direct and/or indirect program interaction) and the commercial market[34].

Residential Market: Behavior Change through Direct Program Interaction

We found a high percentage of participants that changed behavior to conserve energy, installed an energy efficiency measure and took actions that are directly attributable to the program education. The percent of participants that installed an energy efficient measure ranges from a high of 87% among CLEO participants to a low of 70% among Time of Sale participants. (Table 37)

Table 37. Downstream Residential Market Behavior Impacts

Program	Education Method	Residential Market Segment	Actions Taken Since Program Participation & Program Influence on Actions Taken		
			% that changed behavior to conserve energy	% that installed an energy efficient measure	% of Actions Attributed to Program (Cognitive Change Index)
Custom Language Efficiency Outreach (SCG3532/SCE2513)	2-hour seminars	Chinese and Vietnamese Residential	90%	87%	85%
PACE Energy Efficient Ethnic Outreach (SCG3531)	Brief booth interaction	Chinese and Vietnamese Residential	85%	85%	84%

[34] Notably, the Portfolio for the Future program was a unique program in this group. We note that the methods used for evaluating this program were very different from the other programs. Because of the near identical nature of this program and the statewide Emerging Technologies Program (ETP), we chose to follow the protocols for emerging technologies. Details on the indirect impact findings from this program can be found in the Portfolio for the Future program chapter in Volume II of this report.

Program	Education Method	Residential Market Segment	Actions Taken Since Program Participation & Program Influence on Actions Taken		
			% that changed behavior to conserve energy	% that installed an energy efficient measure	% of Actions Attributed to Program (Cognitive Change Index)
Build It Green (PGE2057)	Green Home Tour	General Residential	76%	83%	73%
Time of Sale Energy Check-Up (SDGE3036)	Audit at Time of Home Sale	General Residential	67%	70%	71%
K-12 Energy Efficiency Education (SDGE3032)	K-12 Curriculum	Under 18 years of age	87%[35]	70%	--

By program, the impact on behaviors is detailed below.

PGE2057 Build it Green: Among residential participants in the Green Home Tours:

- 76% changed their behavior with regard to how they use energy in the home since participating in the Tour, such as "turning off lights before leaving a room".
- 83% installed at least one of eleven different energy efficient measures since participating in the Tour. The most common measures installed were energy efficient lights, insulation and windows.
- As a measure of program influence on participants' actions taken since the Tour, 73% of the participants' actions taken since the tour are attributable to the information received at the Tour.

SDGE3036 Time of Sale: Among residential participants in this program:

- 67% changed their behavior with regard to how they use energy in the home since receiving the audit. Participants changed at least one of eight different behaviors. The most common behavior changes were turning off lights before leaving a room, turning off electronics/appliance when not in use and changing air conditioner and heater set points.
- 70% installed at least one of eleven different energy efficient measures since receiving the audit. The most common measures installed were CFLs, programmable thermostats and low-flow showerheads.
- As a measure of program influence on participants' actions taken since the audit, 71% of the participants' actions taken since the audit are attributable to the information received from the audit.

[35] Note very small convenient sample size, n=61 students

SCG3532/SCE2531 CLEO Custom Language: Among Vietnamese and Chinese speaking participants in this program:

- 90% changed their behavior with regard to how they use energy in the home since attending an even, such as "turning off lights before leaving a room".
- 87% installed at least one of nine energy efficient measures since attending an event. The most common measures installed were CFLs, LED night lights and refrigerators.
- As a measure of program influence on participants' actions taken since the event, 85% of the participants' actions taken since the event are attributable to the information received from the event.

SCG3531 PACE Energy Savings Project: Among Vietnamese and Chinese speaking residential participants in this program:

- 85% changed their behavior with regard to how they use energy in the home since attending the event, such as "turning off lights before leaving a room".
- 85% installed at least one of eleven different energy efficient measures since attending the event. The most common measures installed were CFLs, faucet aerators and low-flow showerheads.
- As a measure of program influence on participants' actions taken since the event, 84% of the participants' actions taken since the event are attributable to the information received from the event.

SDGE3032 K-12 Energy Efficiency Education: Again, several evaluation challenges prevented our team from assessing its impact on knowledge and behavior. These challenges and the outcome of our evaluation are detailed the program chapter included in Volume II of this report. However, we found that:

- Almost nine in ten, 87%, of students targeted and exposed to the program reported direct behavior change as a result of the program. The most common change was turning off the lights when they leave a room. In addition, many households (70 percent) claimed that they have replaced incandescent light bulbs with CFLs as a result of the program. Seventy-five percent report reducing the use of their appliances (air conditioners, refrigerators, dryers, water heaters). The change in behavior was not limited to energy issues, but also spilled over into a general increased cognizance of environmental issues. Some of the students and their parents noted they are also recycling more, using reusable bags at the grocery store, and walking more to save gas. [Note that this data is based on a small convenience sample, n=61]

Residential Market: Behavior Change through Indirect Program Interaction

The behavior changes taken by midstream market actors induced behavior change in the residential market, thus these programs indirectly induced behavior change in the residential market. Four of the nine Education and Information programs impacted the energy efficiency behavior of midstream market actors by varying degrees. We assessed the behavior impacts for midstream market programs differently based on the behavior change that was likely to occur in the midstream market and consequently in the residential market.

We captured the level and type of behavior change that occurred with direct participants in these programs. Where possible, we captured the level and type of behavior change that occurred in the residential market as a result of the market actor's behavior change. Below, we discuss the behavior impacts found from our research with midstream market actor participants in each of the Education and Information programs that reached out to this segment.

PGE2044 Builder Energy Code Training: We measured both the behavior change induced in the midstream market and the residential market through the BECT program. Amongst builder participants:

- 70% applied course concepts to their jobs; and
- 54% of builders reported making at least one change to a specific area in a home.

Amongst code official participants:

- 70% received new information regarding the Title 24 code;
- 32% said their knowledge of Title 24 code greatly increased after the training;
- 87% applied course concepts to their jobs; and
- 70% of code officials reported making at least one change to a specific area in a home.

The changes builders and code officials made transferred to changes in the residential building market. This program helped to improve the energy efficiency level of homes by ensuring the homes are built to Title 24 code. The most common areas in the home that improved were lighting, insulation and duct work.

SCE2548 Southern California Home Performance: We measured both the behavior change induced in the midstream market and the residential market through the Home Performance program. Among participants in this training course:

- 92% applied training concepts to the services provided to clients; and
- 90% recommended energy efficient measures learned in training to their clients.

The changes remodeling contractors made to their services transferred to changes in the residential market. The most common energy efficient measures installed in homes were CFLs, programmable thermostats and ducts.

PGE2057 Build it Green: The BIG program indirectly impacts residential market behavior through the information it provides to the market actors and policy makers that participate in its Councils. While we did not capture the level or type of behavior change that is indirectly induced in the residential market through this program component, we did capture the behavior change that the program induced in the mid-stream market. Through the program's general support and education of market-wide councils, and its specific support of the Public Agency Council, BIG has influenced the statewide adoption of green building standards that save 15% more energy than Title 24 standards.

Amongst market actor council members:

- 83% changed or enhanced the services they provide by applying the energy efficient

concepts they learned about at meetings;

- 83% recommended energy saving actions to their clients that they learned about in the council meetings; and
- 61% used building or system design principles that they did not know much about prior to attending the meetings.

Amongst Public Agency Council members:

- 82% helped pass energy efficiency-related building or construction policies since attending the meetings;
- 76% applied ideas they heard about at the council meetings to their work;
- 70% recommended new building design principles they learned about at the meetings; and
- 41% recommended energy modeling for equipment that uses a lot of energy.

SDGE3036 Time of Sale: We measured the level and type of behavior change in the residential market directly from the homeowners that participated in this program. However, we note that the realtors in this program made behavior changes that led to the changes found in the residential market. Among realtors that attended these training sessions, 25% took the steps required to become an EnergyWi$e realtor. Among the EnergyWi$e realtors:

- 100% applied concepts from the training session to the service they provided clients;
- 97% recommended CFLs to clients;
- 95% discussed energy efficiency upgrades with clients;
- 84% recommended home energy audits to clients; and
- 84% used techniques from training to discuss energy efficiency with clients.

Specific Behavioral Changes Induced in the Residential Market

A summary of the behavior changes induced in the residential market is shown below. This table does not reflect the magnitude of energy savings derived from these changes; instead we delve into the energy savings in the next section.

Table 38. Actions and Behaviors Induced In the Residential Market

Action/Behavior	Mid-Stream Programs		Component of Downstream Programs				
	PGE2044 BECT	SCE2048 HP	PGE2057 BIG	SCG3531 PACE	SCG3532/ SCE2513 CLEO	SDGE 3032 K12	SDGE 3036 TOS
Installation Actions Induced							
Lighting	X *	X *	X *	X *	X *	X *	X *
Refrigerator		X	X	X	X *		X
Insulation	X *	X	X *	X	X		X
Air conditioner	X		X	X	X *		X
Programmable thermostat		X *	X		X		X*
Duct replacement/sealing	X*	X *	X				X
Windows	X	X	X *				X
HVAC System/Furnace	X	X	X	X			X
Shell sealing	X	X	X				
Water Heating	X	X	X	X	X		X
Clothes washer/Clothes Dryer		X		X	X	X	
Pool pump/motor			X	X			
Dishwasher				X			X
Faucet Aerator				X*	X		
Low-Flow Showerheads				X*	X	X	X*
Behavior Changes Induced							
Turn off lights			X		X	X *	X *
Reduce appliance use					X	X *	
Turn off/unplug appliances			X		X	X	X *
Reduce air infiltration drafts							X
Insulate water heater pipes							X
Set AC 78 summer/68 winter					X		X

Action/Behavior	Mid-Stream Programs		Component of Downstream Programs				
	PGE2044 BECT	SCE2048 HP	PGE2057 BIG	SCG3531 PACE	SCG3532/ SCE2513 CLEO	SDGE 3032 K12	SDGE 3036 TOS
Use ceiling fan instead of AC							X
Take shorter showers							X
Repair fireplace damper							X

Each row is marked with an "X" if participants self-reported taking a specific action after receiving information from the program. The "X*" cells call out the top three actions taken by participants in each program.

Commercial Market: Behavior Change through Direct Program Interaction

Commercial participants also took actions that are directly attributable to the program education. They changed behavior to conserve energy and installed energy efficiency measures. The percent of participants that installed an energy efficient measure ranges from a high of 83% among PACE participants to a low of 65% among Business Energy Assessment participants. (Table 39)

Table 39. Downstream Commercial Market Behavior Impacts

Program	Commercial Market Segment	Education Method	Actions Taken Since Program Participation & Program Influence on Actions Taken		
			% that changed behavior to conserve energy	% that installed an energy efficient measure	% of Actions Attributed to Program (Cognitive Change Index)
PACE Energy Efficient Ethnic Outreach (SCG3531)	Chinese and Vietnamese Commercial	Business walk-in presentation	95%	61%	83%
Business Energy Assessment (SDGE3040)	Small and medium-sized businesses	Online Audit	88%	63%	65%

A summary of each program's impact on behaviors is provided by program below.

SCG3531 PACE Energy Savings Project: Among Vietnamese and Chinese speaking commercial participants in this program:

- 95% changed their behavior with regard to how they use energy in their business.
- 61% installed at least one of five energy efficient measures since receiving PACE information. The most common measures installed were lighting, air conditioners and refrigerators.
- As a measure of program influence on participants' actions taken, 83% of the participants' actions taken are attributable to the information received from the program.

SDGE3040 Business Energy Assessment: Among participants in this program:

- 88% changed their behavior with regard to how they use energy in their business.
- 63% installed at least one of nine energy efficient measures since receiving BEA information. The most common measures installed were lighting, HVAC systems and refrigerators.
- As a measure of program influence on participants' actions taken, 65% of the

participants' actions taken are attributable to the information received from the audit.

Specific Behavioral Changes Induced in the Commercial Market

The specific behavior changes induced in the commercial market in Table 40 do not reflect the magnitude of energy savings derived from these changes; instead we delve into the energy savings in the next section.

Table 40. Actions and Behaviors Induced by Commercial Programs

Action/Behavior	SCG3531 PACE	SDGE 3040 BEA
Installation Actions Induced		
Lighting	X *	X *
Refrigerator	X *	X *
Insulation	X	X
Air conditioner	X *	X
Duct replacement/sealing		X
Windows		X
HVAC System/Furnace	X	X*
Shell sealing		X
Water Heating		X
Clothes washer/Clothes Dryer		X
Behavior Changes Induced		
Turn off lights		X
Reduce appliance use		X
Turn off/unplug appliances		X
Set AC 78 summer/68 winter		X

Each row is marked with an "X" if participants self-reported taking a specific action after receiving information from the program. The "X*" cells call out the top three actions taken by participants in each program.

10. PROGRAM ENERGY IMPACTS

We determined that the programs bring about behavior changes in their participants. As Education and Information programs, the nine programs covered by this evaluation effort had no explicit energy savings goals. However, we were able to estimate net savings from actions taken by program participants and we present impacts in Table 41.

While there are caveats to our energy saving estimates, we believe that it is possible to determine the magnitude of annual energy savings for many of the Education and Information programs we evaluated in this effort. The fact that we can determine energy savings allows policy makers to decide whether these savings should be included as part of the resource portfolio. We extrapolated our energy savings estimates for these programs back to the population from which we sampled. In some cases this was the participant population, while in other cases this was a smaller population because we were unable to obtain contact information for the entire participant population (or in some cases because the exact number of people attending an event was only estimated and thus not really known)[36]. Table 41 differentiates the number of people for which savings were applied and the participant population of the program. Through applying energy savings to actions taken for the sample populations, we found a range of savings from 53 to 16,950 MWh per program with a total of 33,230 MWh net annual savings and 2.1 million therms net annual savings across all programs (savings equaling approximately 26,992 CO_2 reduction[37]).

[36] We applied best practices for extrapolating from a sample and did not attempt to generalize beyond the sample frame.

[37] See the Additional Reference Information Section in Section D for our conversion .

Table 41. 2006-2008 Education and Information Program Net Annual Energy Savings

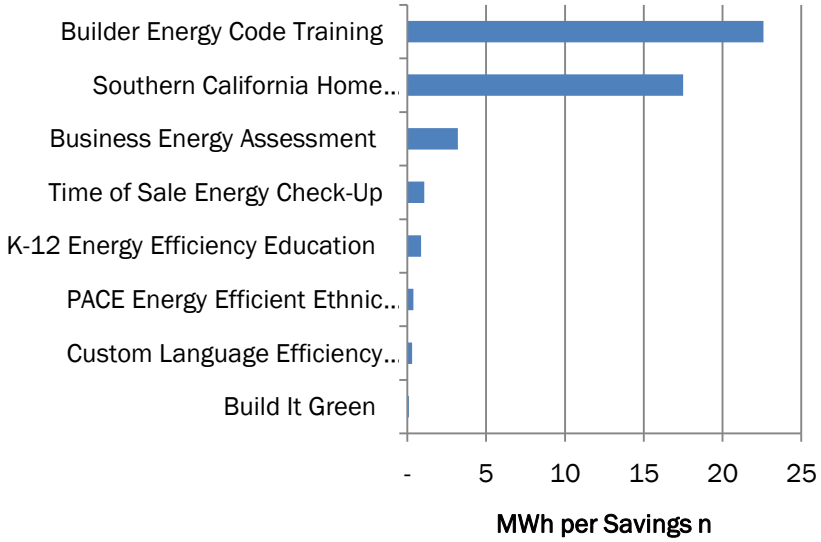
Program	Market	Program Component for Energy Savings	Sample n	Savings n	Population N	MWh*	Therms*	CO_2 Reduction (metric tons CO_2)
Builder Energy Code Training (PGE2044)	Residential	Training Sessions	44	750	750	16,950	1,555,350	16,104
Time of Sale Energy Check-Up (SDGE3036)	Residential	Realtor trainings and homeowner energy reports	130	3,341	3,644	3,614	94,391	2,247
Business Energy Assessment (SDGE3040)	Commercial	Business audits and energy action plans	93	2,562	2,562	8,198	38,942	4,222
Southern California Home Performance (SCE2548)	Residential	Training sessions	47	112	112	1,960	393,467	2,930
PACE Energy Efficient Ethnic Outreach (SCG3531)	Residential and Commercial	Booth Events & Business walk-ins	144	4,082	18,062	1,559	24,633	889
Custom Language Efficiency Outreach (SCG3532/SCE2513)	Residential	Seminars	100	2,660	6,502	798	3,192	408
Build It Green (PGE2057)	Residential	Green Home Tours	143	982	3,413	98	23,666	166
K-12 Energy Efficiency Education (SDGE3032)	Residential	Classroom curriculum	61	61	12,116	53	17	26
				Total	**47,161**	**33,230**	**2,133,658**	**26,992**

*Note: MWh and Therms are based the "Savings n" column. That is, we used the "Savings n" to extrapolate the savings. In some cases, this is our sample population. In other cases, this is the total population.

As a whole, therefore, these programs brought in relatively small levels of savings. We discuss the cost versus value of the programs in the next section, but we note that the total program expenditures for these nine programs (~$15 million of which went toward the eight programs where we estimated savings) is substantially less than other non-resource acquisition assessments, such as Statewide Marketing and Outreach (SWM&O) efforts that totaled $61 million and the statewide training centers that totaled $72.2 million. When looking at rebate programs, these nine programs were similar in magnitude to savings for the net ex ante annual pool pumps programs across the state (at 18 MWh) or the residential mobile homes sector (at 24 MWh)[38].

Another way to look at the programs is by MWh/person in the savings calculations (Figure 2)

Figure 2. MWh per Person in Savings Calculation



Looking across the individual programs, we note several issues related to the energy savings estimates. For example in the PACE evaluation, we prudently extrapolated to less than one-quarter of the estimated population, with potential for higher savings if these participants could have been contacted[39].

We could attribute the least energy savings to the K-12 program, although, on a per-participant basis, it scored closer to the middle (see Figure 2). The K-12 program is the "furthest downstream" program we evaluated, in that the participants are young students who are possibly taking action in their homes, but are also attempting to influence the actions of their parents and by others in their household.

The K-12 program offers value beyond energy savings, and calculating energy savings for this program is complicated by the facts that: 1) for each step away from the specific intervention, there is a tendency for a reduction in actions (and the most savings are likely

[38] Ex ante values from the 4th quarter 2008 IOU reports on the EEGA site.

[39] The largest number of PACE participation is drawn from community events with a booth set up. Our energy savings are based on seminar participants.

due to energy saving actions by others in the household that a student influenced and 2) obtaining contact information for students is difficult because of legal and confidentiality issues associated with contacting minors. As such, the evaluation effort is hampered in its ability to survey the actual program participants, or even family members of these participants. We chose not to extrapolate the savings to a larger population of students and their households as we performed a convenience sample—which is not necessarily representative of the population at large. As such, it is possible that there are greater savings for this program than reported.

On the other end of the spectrum, some programs, such as the BECT and California Home Performance programs, are focused on midstream market actors and can achieve a high level of energy savings through a potential large multiplier effect. The training programs affect a relatively small number of market actors, but their ability to cause changes in multiple locations meant that these programs could have had large per participant energy savings, with BECT having the highest savings among the nine programs. We also found this type of multiplier effect in our evaluation of the Energy Centers[40]. While the TOS program also targeted midstream actors (as well as residential customers), we did not find a large multiplier effect. Both the TOS and the BEA relied heavily on audit information to help end users understand energy saving options. Each program obtained a similar level of savings.

Build It Green, with the smallest per person savings value and the second to the bottom overall savings value, may have not provided as much savings due to the diffuse focus of the Green Home Tours. The tours discuss energy savings along with other "green" actions that may subsume the energy efficiency options. While 83% of Build it Green participants indicate they took some sort of energy efficiency action, the actions they took were associated with low energy savings. This may be a case where the program is successful, but the design of the program did not attempt to emphasize saving energy as a goal. This program is having an effect, but on low-savings measures and practices. A policy decision as to whether energy savings are important for this type of program should be made. . Additionally, our calculation of energy savings for Build It Green home tours was conservative to assure no double counting with rebate programs.

While not included in the energy savings for the programs, one of the case studies for Portfolio of the Future indicated a potential savings of 27 million therms from one of the measures folded into the energy efficiency portfolio. This savings assumes market acceptance of the technology and sufficient items sold through the rebate programs. These possible savings, if present, would be included in future rebate program savings.

Our findings represent the magnitude of the savings from these types of programs. The savings are small, but they do exist. However, we believe that the larger value of the programs lies in where they are targeted, and we focus on that in the next section of this report.

[40] Our case study on ten market actors showed anywhere from an additional 15 to 150 buildings with savings attributable to a single market actor.

11. PROGRAMS' ADDITIONAL VALUE IN THE MARKETPLACE

These programs provide value not only in terms of their reach, knowledge, behavior and energy impacts but also from their contribution to the energy efficient marketplace and market transformation. We identified ten specific areas where these programs provide additional value. Where possible, we collected data to support the findings for some of these added-value areas as part of this evaluation's scope. For others, we note that the added-value is likely present due to program design and discuss recommendations for adding metrics in future evaluations to capture these other impacts in Section: Program Cost versus Value Summary and Key Recommendations. The ten added-value areas are:

1. Channeling customers to resource acquisition programs
2. Contributing to socially equitable access to energy efficiency information
3. Intervening in the marketplace at an optimal point in time
4. Giving the market a stepping stone to "whole home" energy efficiency
5. Educating the next generation of energy users
6. Fostering company-wide environment initiatives
7. Potentially stimulating economic growth
8. Ensuring that the residential building market complies with energy codes and standards
9. Accelerating market adoption of new energy efficient technologies
10. Advancing local energy policies

Below we discuss the ten added-value areas of Education and Information programs.

Channeling customers to resource acquisition programs

Six of the nine Education and Information programs directly targeted residential and/or commercial end-users. Five of these six programs emphasized channeling residential and commercial customers in IOU resource acquisition programs to varying degrees. Furthermore, some of these programs incorporated other utility programs directly into their outreach methods, such as the Home Energy Efficiency Survey (HEES). The five programs channeled anywhere from 4% to 30% of participants into other utility programs. The large range can often be explained by the degree to which each program communicated this type of information to its participants. We briefly describe the degree of utility program emphasis and self-reported channeling rate for each of the six programs that targeted residential and/or commercial end-users below.

SCG3531 PACE Energy Savings Project: As part of community booth events, all visitors were encouraged to take a short version of the HEES (in-language), thereby

incorporating the utility's HEES program directly into this Education and Information program. Survey results show that 21% of residential participants participated in other utility rebate programs after participating in the PACE program. PACE also provides in-language information to business owners and managers. PACE places heavy emphasis on reaching food service establishments that are owned and operated by Asian-language or Hispanic-language speakers and offers them in-language information regarding the food service seminars and rebates available. Survey results show that 30% of commercial participants participated in other utility rebate programs after participating in the PACE program.

SCG3532/SCE2531 CLEO Custom Language: As part of the seminars and community booth events, all program participants were encouraged to take a short version of the HEES (in-language), thereby incorporating the utilities' HEES program directly into this Education and Information program. Furthermore, the seminars presented information regarding other programs for which the residents' might qualify such as the Low Income Energy Efficiency program and other residential resource acquisition programs. Survey results show that 25% of participants participated in other utility rebate programs after participating in the CLEO program.

SDGE3040 Business Energy Assessment: SDG&E offers many programs for small and medium-size businesses including demand-response and rebate programs and the BEA program channels customers into these programs. The BEA program provides businesses with a tailored action plan that identifies energy efficiency opportunities, recommends energy efficiency actions and promotes SDG&E resource acquisition and demand response programs for financial assistance. Survey results show that 22% of participants participated in other SDG&E rebate programs after participating in the BEA program.

SDGE3036 Time of Sale: Realtors participating in the TOS program recommended SDG&E resource acquisition programs to homeowners to help offset the cost of home upgrades when prepping a home for sale or after buying a new home. Furthermore, participating homeowners received energy reports that included SDG&E rebate program information. Survey results show that 18% of participants participated in other SDG&E rebate programs after participating in the TOS program.

PGE2057 Build It Green: Based on the program components that we evaluated, we did not find evidence that the BIG program heavily emphasized other utility programs. However, we found some evidence that the tours promoted rebate programs to a small degree. Participants receive information in print form during the tours that list numerous utility and third party resource acquisition programs. Survey results show that 4% of participants participated in other utility programs after participating in a Green Home Tour.

SDGE3031 K-12 Energy Efficiency Education: Based on this evaluation, we did not find evidence that the K-12 program attempts to promote any other utility programs to the teachers or students that participate in the program.

Education and Information programs that target the midstream market can indirectly channel end-users to utility programs by increasing market actors' awareness of utility

programs and encouraging the market actors to relay that information to their customers. The two programs that focused on the midstream market attempted to increase market actors' awareness of other utility programs by varying degrees. The impact of these two programs on market actor's awareness of utility programs is discussed below.

SCE2548 Southern California Home Performance: During the training sessions, the program verbally discusses utility programs and links the programs to course content where possible. Survey results show that the training greatly increased awareness of utility programs for 60% of participants.

PGE2044 Builder Energy Code Training: During the training sessions, the program does not verbally mention any utility programs, instead limited program information is provided to participant in written manuals. Specifically, only the Build it Green and California Solar Initiative New Homes programs are listed in the manuals. Survey results show that the training greatly increased awareness of utility programs for 38% of builders and 45% of code officials that participated in the training sessions.

Contributing to socially equitable access to energy efficiency information

Two of the nine Education and Information programs filled a gap in the IOUs' portfolio of resource acquisition programs by targeting residential market segments that would likely be overlooked by IOU or statewide energy education efforts due to language barriers. As such, these programs contributed to creating socially equitable access to energy efficiency information in Southern California. Many IOUs and statewide efforts target the predominate languages in the state, English and Spanish, but do not place heavy emphasis on providing energy education in other languages such as Vietnamese, Indian, Chinese and Korean. The Custom Language Energy Efficiency and Outreach (CLEO) and Pacific Asian Consortium in Employment Energy Savings Project (PACE) in SCG and SCE territories both helped to expose these often linguistically isolated populations to basic energy saving information. The linguistically isolated nature of the population targeted by PACE and CLEO help explain why these programs were able to generate some of the largest increases in energy efficiency knowledge (>50%) compared to the other programs that directly targeted end-users (41% or less).

SCG3531 PACE Energy Savings Project: By staffing booths at ethnic events with Asian-language and Spanish-Language speakers and providing in-language energy saving education; a mix of in-person conversation, print collateral, Home Energy Efficiency Surveys (HEES) and hotline support; the PACE program penetrated non-English-speaking populations that otherwise would not have received as much energy efficiency information as the general population. In addition, by walking into businesses likely owned or operated by non-English speakers and providing in-language energy saving education; a mix of in-person conversation, short presentations, print collateral, and hotline support; the PACE program penetrated non-English-speaking business owners and managers that otherwise would not have received as much energy education from the other IOU and statewide efforts.

SCG3532/SCE2531 CLEO Custom Language: By conducting hour-long seminars in-language, and providing Asian-language energy saving education; a mix of

PowerPoint presentation seminars, in-person conversation, print collateral, Home Energy Efficiency Surveys (HEES) and hotline support; the CLEO program penetrated non-English-speaking populations that otherwise would not have received as much energy efficiency information as the general population.

Intervening in the marketplace at an optimal point in time

By program design, three of the nine Education and Information programs provide end-users with energy efficiency information at an optimal point in time when end-users are already in the market for home improvements or just before end-users will be in the market for home improvements. As such, energy education can influence end-users immediate and near-future purchasing decision.

The SDGE3036 Time of Sale program introduced energy efficiency education at a time when residents were likely to invest in home improvements; when residents were prepping a home for sale on the market or after residents purchased a new home. This program produced the largest amount of electric savings (3,616) compared to the other programs that directly targeted the residential market. This is mostly because a good percentage of participants invested in upgrading major appliances in the home after program participation including refrigerators (38%), clothes washers (28%) and dishwashers (22%).

The PGE2057 Build it Green program introduces energy efficiency education at a time when residents are already in the market for home improvements through its project consultations; when residents are in the design-stage of new construction or remodeling projects. All of the residential participants in the project consultations made home improvements to reduce energy with the exception of some projects that were never completed.

The SCE2548 Southern California Home Performance encourages market actors to introduce energy efficiency education to residential homeowners at a time when residents have already hired a contractor for a home improvement. Contractors are encouraged to take an existing job, such as an air conditioner replacement, and expand that opportunity to include additional energy efficiency improvements in the home. Survey results show that almost every participant recommended further energy improvements to their clients.

Giving the market a stepping stone to "whole house" energy efficiency

By program design, two of the nine Education and Information programs give residential end-users a stepping stone into the concept of a "whole house" approach to energy efficiency. These programs introduce this concept in different ways. The SCE2548 Southern California Home Performance program encourages homeowners to consider the energy efficiency of their entire home at a time when a homeowner is making a home improvement. The PGE2057 Build it Green program helps residents construct an energy efficient home after residents have already made the decision to take a "whole house" approach to energy efficiency. The BIG program helps residents that want to build an environmentally-friendly and energy efficient home but who may not want to spend the time, resources and money

involved in getting full LEED certification. The LEED certification standards are more rigorous and costly than the BIG rating system. The BIG rating system offers residents a stepping stone to build homes that are at least 15% more efficient than Title 24 standards. The BIG program therefore appeals to these residents who want to take action towards building a "green home" but may not be ready to fulfill the requirements for LEED certification.

Educating the next generation

By design, one of the nine Education and Information programs is making energy efficiency and conservation education a part of the next generation's standard K-12 science curriculum. Youths, under the age of 18, are often not targeted by resource acquisition programs as they are typically not the purchasers or decision-makers in a home. However, The SDGE3032 K-12 Energy Efficiency Education program provides energy conservation and efficiency concepts to this younger population with the goal of building a knowledge base over time that will translate into both immediate and long-term energy savings. The K-12 program stresses the importance and benefits of energy efficiency in San Diego's K-12 standard science curriculum. This program plays a role in educating students on energy efficiency, but program design and the ability to evaluate K-12 programs longitudinally will reveal whether K-12 education and information programs can play a significant role in achieving energy savings.

Fostering company-wide environmental initiatives

One of the two programs that directly targeted commercial customers helped foster company-wide environment and energy saving initiatives by providing easily consumable and sharable information. The SDGE33040 Business Energy Assessment program created an energy assessment report for businesses with this goal in mind. The program provides action plans that help facilitate a discussion around energy efficiency in business by providing energy efficiency information in a format that is easy to read and share. Survey results revealed that seven in ten (69%) participants shared the action plans with others in their company. By design, the program can help employees who want to champion energy efficiency within their company by helping them to quickly determine energy efficient opportunities and cost saving estimates as well as identify financial resources for their specific company. While measuring these impacts was outside the scope of this evaluation, we recommend including these types of metrics in future evaluations.

Potentially stimulating economic growth

Two of the programs that targeted midstream market actors helped train market actors to sell the benefits of energy efficiency with the expectation that touting energy efficiency would help expand the market actors' business opportunities. The programs trained market actors, i.e., realtors and remodeling contractors, to market or "sell" the benefits of energy efficiency to their residential customers. Using energy efficiency as a "selling point" was expected to help market actors further market their businesses, differentiate their business in the marketplace, and ultimately lead to business growth. Capturing the programs' impact on business growth was outside the scope of this evaluation but is recommended as a metric for future program evaluations if a program intends to have this type of impact on its participants. Descriptions of how these two programs that intended to stimulate economic

growth are provided below.

SDGE3036 Time of Sale: Participating realtors in the TOS program were educated on the benefits of energy efficiency and encouraged to introduce energy efficiency to their clients. As such, these market actors were put in a position to educate clients on energy efficiency as part of their interaction with home buyers and sellers. Further the TOS program attempted to use energy efficiency as a sales tool to help realtors sell homes. "Energy Rated" signs for selling homes were expected to attract homebuyers, "Energy Check-Up Reports" were expected to increase disclosure and quicken the sales process, and "EnergyWi$e Partner" branding on realtors business cards and other self-promoting collateral were expected to increase their clientele.

SCE2548 Southern California Home Performance: The HP program teaches contractors and energy consultants to expand their current services by encouraging their clients to improve the energy efficiency of their entire home. By focusing on marketing as well as technical training, the program prepared contractors to both sell and install measures that improve the energy performance of a home. This program teaches market actors how to leverage an existing retrofit opportunity such as an HVAC replacement into larger business opportunity by identifying and recommending other upgrades to improve the energy efficiency of the entire home.

Ensuring that the residential building market complies with energy codes and standards

While many of the Education and Information programs attempted to move the residential and commercial markets beyond energy standards, one program focused on ensuring that builders and code officials are brought up to code. The PGE2044 Builder Energy Code Training program provided the education needed to ensure that market actors meet the ever evolving Title 24 code. Through classroom and on-site code education, the BECT program maintains and confirms builders' and code officials' knowledge of Title 24 code and shows market actors how to successfully meet code changes. The Title 24 code is continuously evolving and the building community needs to be informed and trained on code updates – so that there is market-wide compliance and enforcement.

Accelerating market adoption of new energy efficient technologies

Education and Information programs that support the research and development for new energy efficient technologies can play an important role in helping to advance the market's acceptance of these new products by providing the needed data to include them into resource acquisition programs. The SCG3530 Portfolio for the Future program is the only program in this evaluation that fits into this type of program. This program helps to get feasible and acceptable new energy efficient technologies onto the market through inclusion in resource acquisition programs. It makes product manufacturers more aware of a given product's market potential in Southern California which can result in a greater focus of marketing efforts. The program helps to scan and screen new energy efficiency technologies for the market and helps build a case for new technologies that address the needs and concerns of end users. Ultimately, this program helps new technologies by bringing them into resource acquisition programs.

Advancing local energy policies

The Build It Green program helped local governments pass mandatory green building requirements using principles from the GreenPoint Rated Checklist. BIG promotes communication and cooperation across all councils around the state, and so local adoption of policy based on the GreenPoint Rated Checklists appears to influence similar adoptions at the regional level. This 'trickle up' effect has influenced Home Building Associations' standards, one of the largest benefits of the councils. The program has attracted the attention of home builders associations who recently endorsed the adoption of the same standards. Some examples of Builder Associations that have recently adopted BIG standards are:

- In January 2008, the Home Builder's Association endorsed the adoption of mandatory green building standards in all 101 Bay Area cities and counties.
- In October 2008, the Building Industry Association of Central California recommended the GreenPoint Rated System as the model program for voluntary green building policies, in part because the board recognized that 1) the program was already being used throughout California; 2) that it was the dominant program being used by Bay Area government jurisdictions; and 3) that training for both members and jurisdictions that adopt the program is available.41
- Recently, in March 2009, the statewide California Building Industry Association also endorsed the GreenPoint Rated approach to building.

11.1 *Role in California's Long-Term Energy Efficiency Strategic Plan*

As shown in the previous section, the Education and Information programs brought numerous benefits to the marketplace in PY2006-2008. In the fall of 2008, the CPUC released a Long-Term Energy Efficiency Strategic Plan (Plan), which "set forth a roadmap for energy efficiency in California through the year 2020 and beyond" and articulated "a long-term vision and goals for each economic sector and identifies specific near-term, mid-term and long-term strategies to assist in achieving those goals".[42] Many of the education and information programs contained in this study will likely contribute to the goals and strategies set forth in the Plan for many of the economic sectors. Table 42 below shows each of the Education and Information programs included in this evaluation that continued into PY2009. It also indicates which of these programs will likely contribute to each economic sector's goals and strategies that were articulated in the Plan.

[41] http://www.builditgreen.org/press-release-biacc

[42] "California Long-Term Energy Efficiency Strategic Plan", California Public Utilities Commission, September 2008.

Table 42. 2006-2008 Education and Information Programs Help the Long-Term Energy Efficiency Strategic Plan

Education and Information Programs (2006-2008)	CA Long-Term Energy Efficiency Strategic Plan Economic Sector Goals (2009 and Beyond)						
	Residential Sector (including low income)	Commercial Sector	HVAC	Codes and Standards	Workforce Education and Training	Research and Tech	Marketing Education & Outreach
Custom Language Efficiency Outreach (SCG3532/SCE25	x						x
PACE Energy Efficient Ethnic Outreach (SCG3531)	x	x					x
Business Energy Assessment (SDGE3040)		x					
K-12 Energy Efficiency Education (SDGE3032)	x				x		x
Build It Green (PGE2057)	x		x	x			
Southern California Home Performance (SCE2548)	x	x	x		x		
Builder Energy Code Training (PGE2044)	x		x	x			
Portfolio for the Future (SCG3530)						x	

Note: Time of Sale Energy Check-Up (SDGE3036) is not included as it was discontinued after PY2006-2008.

Many of the goals and strategies presented in the Plan include education components however "Education and Information" programs are not called out explicitly. Education and Information programs are not described under Marketing Education and Outreach (ME&O), nor are they described in the specific sectors; however, many of them do align with targeted sectors and they can be valuable in these areas if the goals are developed to complement the sector goals. Notably, past efforts to choose and develop Education and Information programs have not been coordinated in this manner (i.e., with rebate programs, or with each other).

12. PROGRAM COST VERSUS VALUE SUMMARY AND KEY RECOMMENDATIONS

The value of the Education and Information programs comes from where they lie relative to the marketplace and how they work within the overall set of strategies in place within the state to engender energy savings. As seen throughout this report, these types of programs account for a small but measureable degree of energy savings outside of resource acquisition programs, but bring about other valuable changes and impacts in terms of reach, knowledge and behavior change. Table 43 below summarizes the metrics that we used in this evaluation to determine the overall value of each program versus its cost.

Notably, looking at energy savings on its own without the context of other key metrics can severely skew the analysis as to whether these programs are valuable or not. In many cases, the overall program costs are focused on much more than achieving energy savings, yet our cost comparisons below do not fully capture this fact.

Table 43. 2006-2008 Education and Information Program Cost Versus Value

Program	Program Expenditures	Participant Type	% Reported Large Knowledge Increase[43]	MWh savings	Therms savings	CO_2 Reduction (metric tons CO_2)	Additional Program Value
PACE Energy Efficient Ethnic Outreach (SCG3531)	$3,037,863	Chinese & Vietnamese Commercial	63%	1,559	24,633	889	-Channeling to Resource Acquisition (RA) programs -Contributing to social equity -Diffusion of information
		Chinese & Vietnamese Residential	60%				
Portfolio for the Future (SCG3530)	$2,492,237	The assessment of the value of the program lies in the potential for future energy savings from the measures introduced into the resource acquisition programs. One of the projects has forecasted a potential savings of 27 million therms if market acceptance occurs.					
K-12 Energy Efficiency Education (SDGE3032)	$1,992,401	Teachers	96%[44]	--	--	--	-Educating the next generation -Diffusion of information
		Students	--	53*	17*	26*	
Build It Green (PGE2057)	$1,735,003	Green Home Tour Residential Participants	41%	98	23,666	166	-Channeling to RA programs -Intervening at an optimal point in time -Giving the market a "stepping stone" -Diffusion of information
		Council Members	46%	--	--	--	
Builder Energy Code Training (PGE2044)	$1,548,426	Builders	23%	16,950	1,555,350	16,104	-Multiplier effect -Channeling to RA programs -Code compliance
		Code Officials	32%	--	--	--	

[43] Gave a 6 or 7 rating on a 7-point scale

[44] Gave a 4 or 5 rating on 5-point scale

Program	Program Expenditures	Participant Type	% Reported Large Knowledge Increase[43]	MWh savings	Therms savings	CO_2 Reduction (metric tons CO_2)	Additional Program Value
Southern California Home Performance (SCE2548)	$1,409,355	Remodeling contractors and energy consultants	79%	1,960	393,467	2,930	-Multiplier effect -Channeling to RA programs -Intervening at an optimal point in time -Giving the market a "stepping stone" -Potentially stimulating economic growth
Custom Language Efficiency Outreach (SCG3532/ SCE2513)	$1,345,927	Chinese and Vietnamese Residential	52%	798	3,192	408	-Channeling to RA programs -Contributing to social equity -Diffusion of information
Time of Sale Energy Check-Up (SDGE3036)	$1,009,819	Realtors	40%	3,614	94,391	2,247	-Channeling to RA programs -Intervening at an optimal point in time -Potentially stimulating economic growth
		Homeowners	38%				
Business Energy Assessment (SDGE3040)	$634,864	Small and medium-sized businesses	24%	8,198	38,942	4,222	-Channeling to RA programs -Fostering company environmental initiatives

*Note: The K-12 energy savings were not extrapolated to the 12K+ students that participated in the program due to the small convenience sample from which the energy savings were calculated.

12.1 *Recommendations*

In this section, we provide a few recommendations based on our indirect impact research to help with future program design and evaluation efforts. Specifically, in this section, we provide:

(1) Recommendations for program design, and

(2) Recommendations for future evaluation efforts.

12.1.1 Recommendations for Program Design

Below we provide some recommendations for designing Education and Information programs in the future, with a specific concentration on how they fit into the current Long-Term Energy Efficiency Strategic Plan for California. The Plan articulates strategies to achieve an optimal level of energy efficiency in the state. Understanding where Education and Information programs might be needed to achieve the goals outlined in The Plan will help ensure that future Education and Information programs are aligned with the sector strategies and objectives. As such, we recommend changes to overall program design below.

- **Determine where Education and Information programs are needed to achieve each sector's goals in the Long-Term Energy Efficiency Strategic Plan for California.** A gap analysis that examines the areas where education is needed against what is available will help to identify the markets that need training and the type of information they need. To achieve this end, we specifically recommend the following:
  - Consider how the continuing Education and Information programs relate to the 2010-2012 Statewide Marketing & Outreach and Local Governments Partnership efforts throughout the state since there may be significant overlap with those efforts both in terms of the information provided and the target markets.
  - Assess the programs against the Strategic Plan and determine how these types of programs can help fulfill the Plan's objectives.
- **Set realistic expectations for new Education and Information programs by acknowledging the time it takes to ramp up and "future" value for those that take longer to ramp up.** The value of these programs will be different based on how long the programs have been in the marketplace. As such, realistic expectations for the programs should be set for new Education and Information programs within the first 3-year program cycle, acknowledging that their value will likely improve over time after the initial investment.
  - It takes a significant amount of time to ramp up a new Education and Information program, especially when it is implemented by a third-party. Utilities have some mechanisms to ramp up pilot programs prior to the program cycle, while the same mechanisms are not available for third-party programs. Meaning that third-party programs are typically starting from scratch when the program cycle begins while many utility programs have a head start. Implementation schedules should take into account the time it takes to develop and sign contracts for third-party implementers (this can take up to 6 months), create educational materials, and flesh out

implementation strategies. This ramp-up time can be significant: For the new programs in this evaluation, the ramp-up period took anywhere from 3 months to 2+ years, meaning that some programs did not even get to touch participants until more than halfway through the 3-year program cycle. Therefore, some programs may not be as cost-effective in the first three years as they will be in the next program cycle. For example, a large amount of funds were needed in the first three years of the Business Assessment program to create the online business audit and energy plans. Future funds will likely be limited to technical support and marketing costs. Similarly, a large amount of funds were needed to create the curriculum and teacher training for the K-12 program. Now that the curriculum has been developed, less investment in the program should be needed in the future. Consider assessing program effectiveness by allowing the programs to amortize the start-up costs over a longer time period—this will provide a truer yearly cost for the overall portfolio.

- **Consider that programs designed to target market actors often have the potential to touch more individuals due to the multiplier effect.** This evaluation showed that Education and Information programs that target market actors can be more cost-effective, given that the programs may only need to educate a small number of market actors to affect the energy consumption of a larger number of homes or businesses in the market. However, not all market actors are created equal. Market actors such as builders or remodeling contractors are often in a good position to influence the behavior of end-users while realtors and home inspectors may have less influence.

12.1.2 Recommendations for Future Evaluation Efforts

Below we provide some recommendations to help evaluation efforts. We discuss some suggestions for the metrics against which Education and Information programs could be measured, suggestions for how to best group these programs in future evaluations and the rigor level that is realistic for these programs, and suggestions for how to best transfer data between evaluators and third-party program implementers.

Metrics

The metrics of program success that we were given for this evaluation (behavior change and the resulting energy savings) capture some, but not all, of the potential impacts that can be measured for Education and Information programs. As such, we recommend the following:

- **Success metrics should be based on the role each program is expected to play.** These programs played several valuable and varying roles in the marketplace. For future efforts, the roles that each of the programs play in the marketplace should be clearly defined and the programs should be measured based on those roles as well as the current performance metrics.
    - Defining metrics based on each program's role will better capture all potential impacts (beyond energy savings) of the program. For example, supporting company-wide environmental initiatives or stimulating economic growth could be performance metrics that are assessed in future evaluations if a given Education and Information

program intends to have this type of impact on its participants.

- The role that each Education and Information program will play in the marketplace will determine whether energy savings is an important metric to measure in future evaluations. We believe energy savings should not be the only success metric for Education and Information programs.

Methods

- **Consider the best way to group Education and Information programs for future evaluation efforts or even whether they should be grouped.** The common thread throughout these 19 programs was they were all non-resource acquisition programs and were mainly implemented by third-parties. However, they differed drastically in terms of their role in the marketplace, the type of energy education they provided, the method for educating participants, and the markets they targeted. This presented a challenge for applying one method or set of research questions across all programs. In particular, the Portfolio of the Future program was so drastically different from the other programs that it should have been assessed entirely on its own or grouped with other similar program assessments such as the Statewide Emerging Technology program. These programs are probably best grouped by the market sectors that they directly target in future evaluations.

- **Set realistic expectations on what can and should be performed for each program evaluation given its size and budget.** For some programs, the cost to capture energy savings may be justified given the budget. For other programs, implementation effectiveness and knowledge impacts may be sufficient, while still other programs may only justify verification efforts. Furthermore, process and impact evaluations should be closely coordinated or even conducted at the same time by the same evaluation team to minimize participant intrusion and to collect participant data in a more cost-effective manner.

Data Requests

While our research was able to document both energy and non-energy impacts for most of the nine programs, we did encounter limitations in our efforts. As such, we make the following recommendations regarding collecting program data for future evaluations of the Education and Information programs.

- **Allow evaluators to directly contact third parties to collect program information.** We encountered several issues going through the formal data request process to collect program information from the third-party implementers. The process is in many ways a "black box." Most of the challenges would have been mitigated if evaluators can request information directly from the third-parties. For example, for the Southern California Home Performance program, we submitted a data request, assumed it was received by the utility program manager and forwarded to the third-party implementer. We gave the utility and the third-party several weeks to respond. When the data request due date passed, we discovered that the request went unanswered. After several calls, we then discovered that the program manager no longer worked for the utility and the third-party implementer never received the request. When we asked the third-party for the

information directly, we received the information within 24 hours. Additionally, in our evaluation of the Time of Sale program we noted that we did not receive some of the information we had requested from the implementer through the utility. Since we did not receive the requested information, we assumed that the program did not have it. After the implementer reviewed the draft report, they informed us that they did have this information and cited a misunderstanding during the formal data request process for why we had not received it. This misunderstanding likely would have been mitigated or resolved early in the evaluation had we communicated directly with the implementer during the data request process.

In addition, in each of the Program-by-Program chapters included in Volume II of this report, we provide recommendations for how the programs can improve program tracking efforts to help with future evaluations. We encourage the program implementers to take these recommendations into consideration so future evaluations can best capture and quantify the success of these programs.

APPENDIX A: PERFORMANCE METRICS

Performance metrics for each program are provided in Volume II.

APPENDIX B: DISCUSSION OF DATA REQUESTS

A discussion of the data requests for each program is provided in Volume II.

APPENDIX C: COGNITIVE CHANGE INDEX (CCI) METHODOLOGY

In - typical resource acquisition programs, participation is defined as using program support to install a particular measure or take a specific action. When we measure net effects for these type programs, a net-to-gross ratio is applied to gross energy impacts to *screen out* free-riders, that is, program participants "who would have implemented the program measure or practice in the absence of the program."[45] The default assumption is that the participant took the actions as a result of the program (i.e., net? savings) and - questions are asked to disprove this assumption.

For non-rebate programs such as education and information we need to consider a different approach for determining net savings. Education and information programs have "participants" that are often hard to find, or may not even know they are participants (in the case of marketing program efforts). When we attempt to look at energy savings for these informational programs, we are "building up" the savings; we cannot assume that participation equates with taking energy saving action. The default assumption for each person touched is that they learned something that would change future energy saving actions. As such, we must adjust the standard concept of net-to-gross (screening out savings) for education and information programs.

Based on background research on how to best measure the impact of informational campaigns, we developed survey questions that combine to create a cognitive change index (CCI) that we use as a proxy for net savings analysis.[46] In this appendix, we present information on the background and development of the CCI. Because the CCI is a new way

[45] California Energy Efficiency Evaluation Protocols: Technical, Methodological and reporting Requirements for Evaluation Professionals. April 2006. TecMarket Works Team, p 226.

[46] In August 2008, the Evaluation Team worked with the CPUC and MECT to arrive at an agreed upon method for calculating net behaviors for all three evaluation efforts led by Opinion Dynamics: the Statewide Marketing & Outreach programs, Statewide Education and Training Program, and the Information and Education Programs. It was agreed that Opinion Dynamics would adjust the questions used in the CCI calculation based on the program differences but use the same approach (i.e., calculate the CCI) for all three of the evaluation efforts.

of calculating net behavior change, we use data collected through our surveys to show how we construct the index and to test its validity.

This remainder of this section is organized as follows:

- A discussion on the unique characteristics of education and information programs, and the constructs we need to measure to assess net behavior change.
- A discussion of the specific survey questions asked in our participant surveys that we use in the CCI calculation.
- A presentation of the algorithm used to calculate the CCI.
- An analysis to test whether the questions appear to be a valid measurement of net behavior change.

Unique Characteristics of Education and Information

Standard net-to gross (NTG) questions about whether the respondent would have "paid the additional amount on their own" do not work since education and information do not provide any form of direct incentive or financial support. Moreover, batteries of questions such as the current California non-residential NTG battery asks to rate program effects (that is, rebates or incentives) relative to other effects. However, the other effects considered are typically not applicable for education and information programs. When we attempt to understand the net effects of education and information programs, we need to consider the following:

- Education and information programs are not as tangible as a financial rebate.
    - While some efforts like trainings may occur on a particular day, other efforts such as a community event, advertising, receiving a brochure or visiting a website are harder to attribute to one particular day, and may be difficult for an individual to recall even if they were exposed, much less when. Even details about a training can be difficult to remember as time passes. This makes causality difficult to assess well.[47]
- Education and information cannot always be separated from other efforts. That is, these efforts often lead to the next step in a web of related behaviors and influences that ultimately lead to the energy saving action.
    - Notably, even with rebates or financial incentives, there is at some point in time education about both the rebate and the measure or action that occurs prior to the customer taking any action. As such, "education" cannot always be teased apart from the more tangible rebate (e.g., How much did learning about the

[47] Roger Tourangeau (in *The Science of Self-Report. Implications for Research and Practice*) calls this an encoding error – people never form a representation of an event or what is formed is so sketchy "as to render retrieval difficult or impossible" (p. 31).

rebate affect your action versus how much did the actual rebate affect your action? These are difficult to separate.)[48]

- Education and information programs are generally thought of as contributing to actions; they lay the groundwork for the ability to take reasonable actions. However, they are not usually the sole reason (or even a critical reason) for taking action.
    - While it may be a more critical factor if the respondent was totally unaware of the action prior to the effort, asking what would have been done in the absence of seeing an advertisement, attending a training, or viewing a brochure is not as likely to provide valuable information as it becomes too hypothetical and abstract to obtain valid measurements. For example, if the question is asked, *If you did not know about this action, what do you think you would have done?* The obvious response is: *Not do that action.* However, it is highly likely that learning more about an action provided the "tipping point" that, combined with the ability to make a purchase or take an action not required financing, brought about energy saving actions.

We researched previously created scales designed to measure cognitive change. We reviewed three sources:

- Marketing Scales Handbook. A Compilation of Multi-Item Measures. Gordon C. Bruner II and Paul J. Hensel. 1992 American Marketing Association.
- Handbook of Marketing Scales. Multi-Item Measures for Marketing and Consumer Behavior Research. William O. Bearden and Richard G. Netemeyer. 1999. Sage Publications Inc.
- Marketing Scales Handbook. A Compilation of Multi-Item Measures for Cosumer Behavior & Advertising. Volume IV. Gordon C Bruner II, Paul J. Hensel, Karen E. James. 2005. Thomson Higher Education.

Ultimately, we choose a scale from the last source that had a Cronbach's alpha of 0.79 (i.e. is based on questions that measure the same construct) and dealt with cognitive change.

Survey Questions Used in the CCI Calculation

The CCI determines cognitive change based on three specific concepts:

(1) Was the information presented new?

(2) Was there a cognitive change based on the information?

(3) Direct self-report of program influence on actions taken.

This core set of questions was asked of all participants.

[48] This difficulty is similar to when Tourangeau writes "What we retrieve from memory often consists of our current beliefs about an incident, beliefs that reflect what we actually experienced (and remember), what we did not experience but infer, and what we learned later on." (p 35)

Concept 1 – Was the information learned new?

Program theory indicates that the courses must be responsible for increasing knowledge to be given credit for actions taken. Therefore, if the information was not new or did not move forward existing plans then the course information was not part of the reason why actions were taken. To measure this concept, we asked the following two questions:

- C1_1. Did the course(s) provide you with any new information? (Yes=1, No=0)

If the respondent indicated a "No" to C1_1, they were asked C1_2.

- C1_2. Although you don't think the course information was new, did your participation in the course(s) move you any closer to implementing efforts to save energy that you were already considering? (Yes=1, No=0)

Because both these questions are given equal value, it is the maximum of these two values that is used in the calculation of the CCI.

Concept 2 – Was there a cognitive change based on the information?

The course must create a cognitive change before actions taken are considered attributable to the program. Although similar to concept 1 as both are attempting to measure cognitive change, it is different from concept 1 because it is measuring a range of change, not a dichotomous value.

We tailored the wording for the following four questions to work well for each of the respondent types (i.e., commercial, residential, and market actor survey respondents).

The following three questions were all asked on a 7 point scale where 1 means 'not at all' and 7 means 'a great deal':

- C2_1. How much did the course(s) cause you to think differently about energy efficiency opportunities?
- C2_2. How much did the course(s) cause you to want to make energy efficiency changes?
- C2_3. How much did the course(s) increase your awareness of energy efficiency opportunities?

The last question was asked on a 7 point scale where 1 means 'strongly disagree' and 7 means 'strongly agree':

- C2_4. The course(s) [was/were] a good way to explain the importance of taking advantage of energy efficiency opportunities.

Our value for Concept 2 is the mean of these four questions.

Concept 3 – Self-report of influence on actions taken

The third measure is a direct self-report of influence of program information on actions taken.

This question was asked on a 7 point scale where 1 means 'not at all influential' and 7 means 'very influential':

- C3_1. How much influence did the information provided in the course(s) have in your decision to make the changes?

CCI Algorithm

The algorithm used to calculate the CCI is shown below:

CCI = W1[max of C1_1 and C1_2] +*
W2[(average of (C2_1, C2_2, C2_3, C2_4)-0.17)/0.17] +*
W3[(C3_1-0.17)/0.17]*

Where:
W1=0.1
W2=0.7
W3=0.2

W1, W2, and W3 represent the weights assigned to each concept. We chose the weights based on the relevancy of each research question and our confidence that respondents were able to accurately provide answers. Because the three concepts do not share the same scale and for ease of computation of net behaviors, we standardized the scales of Concepts 2 and 3 so that they ranged from 0 to 1. This required us to apply a factor of .17 to each Concept, as shown in the formula above.

Application of CCI to Energy Savings

The CCI questions were asked only once of each respondent. We did not believe it was practical to ask about the influence of the course on each action or behavior change participants made. As such, the CCI is applied to all energy saving actions for which we were able to calculate energy savings. We calculate net energy savings by multiplying the CCI by gross savings:

*Net kWh Savings = Gross kWh Savings * CCI*

Analysis to Determine Validity of CCI

In the next section, we conduct a series of tests to determine whether the CCI is a valid approach. For this analysis, we use data from our course participant surveys to verify that the CCI calculation approach is robust (i.e., appears to measure what we expected and shows variation).

Comparison of Level of Influence Index to Direct Influence Question

We assumed that the calculated index should not be wildly different than a self-reported influence (concept 3).

Figure 3 shows the variation within the CCI, including all three concepts for those who made

a change while Figure 4 is just the direct influence question.

Figure 3. CCI with all 3 concepts

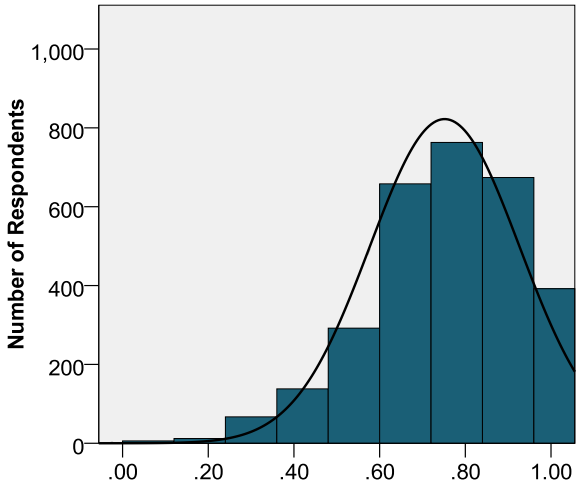
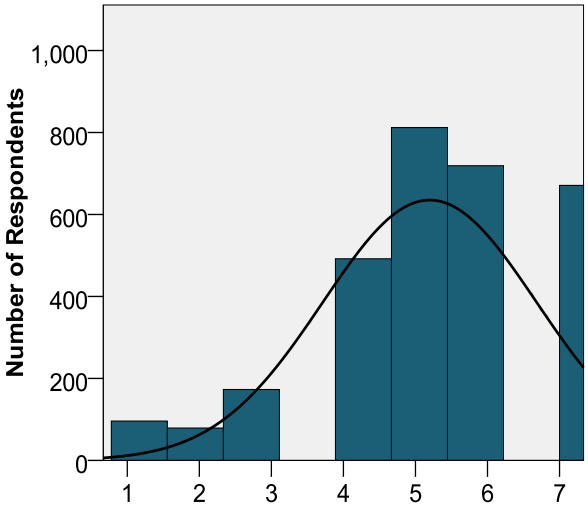


Figure 4. Direct Influence Question



The two graphs show a similar distribution. Both the CCI and the direct program influence question (i.e. Concept 3) are skewed to the left indicating greater program influence. That both measures come to the same conclusion on program influence provides support for use of the CCI.

CCI Question Correlations

The index must be viewed as similar concepts by the respondent to be a successful index. To test this, we calculated a Cronbach's alpha[49] for the questions. This value indicates whether the questions "hang together" as a concept. Information from the first tracking survey had a Cronbach's alpha of 0.85, which supports the use of the CCI as a reliable index.

CCI Value Variation

We also looked at the variation within the CCI value by first computing it using our planned weighting and then by changing the number of questions within the index and lastly, changing their weights.

Table 44. Variation by Number in CCI and Weighting

Test	CCI Value
CCI (Concept1 * .1) + (Concept2*.7) + (Concept3*.2)	0.75
Two Concepts (Concept1 * .2) + (Concept2*.8)	0.74
Three Concepts (Concept1 * .25) + (Concept2*.25) + (Concept3*.5)	0.78

As shown Table 44, there is little variation when changing the number of concepts or weights. The amount of variation is quite small and suggests that different weighting schemes .

Taking Action and CCI

Concept 2 of the CCI measures change in energy efficiency attitudes due to course participation and is the most heavily weighted component of the CCI. The course must create a cognitive change before actions taken are considered attributable to the program.

To test the validity of our measure of cognitive change, we examined whether Concept 2 was associated with taking energy saving action. If it is not, Concept 2 may not be measuring what we want it to. The results indicate that the more participant attitudes towards energy savings changed, the more likely they were to take energy saving action. This finding supports the validity of the questions as an influence concept.

Table 45. Relationship to Taking Action and CCI

Concept 2: Cognitive Change	% Taking Action			
	All	Market Actors	Commercial End-Users	Residential End-Users
Low (1.0 - 2.50)	28%	29%	32%	20%
Moderate (2.51 - 5.50)	62%	65%	72%	32%
High (5.51 - 7.0)	82%	89%	86%	57%

[49] Cronbach's alpha is a statistical test that measures the internal reliability or consistency of a number of items within a scale or index. The value ranges from 0 to 1.0 with values towards the higher end (above 0.70) suggesting that the items are measuring the same thing.

APPENDIX D: ENERGY SAVINGS ANALYSIS

This appendix includes the source information used to calculate the energy savings for each program. The appendix is broken up into four sections:

- **Energy Savings Measures – Uses and Attributes** includes a list of the individual measures used in calculating energy savings for the programs, which programs they were used for, their information sources, their unit savings, and which fuel share adjustments were applied.
- **Measure Specific Values and Assumptions** includes references and assumptions for each of the individual measures used. The measure number in the first tables map to the values shown in parentheses of the name in this section (i.e., SID 1 maps to Measures #1 in the previous section)
- **Measure Information for BEA** includes a summary of the methods Summit Blue used to estimate energy savings from the more extensive BEA battery.
- **Additional Reference Information** shows 1) the actual fuel share adjustments for each utility along with source information, and 2) CO_2 reduction conversion and source information.
- **Energy Savings Spreadsheets by Program** shows the measures used for each program, the number of measures installed, unit savings, and total savings per measure. These tables also show the gross total, level of program influence, net total, per participant savings, extrapolated savings, and CO_2 reduction. Note that the calculations involved fuel share adjustments, which are shown in the "Additional Reference Information" section.

Energy Savings Measures – Uses and Attributes

Meas #	Measure Description	RES or NON-RES	Program										Source						Unit	kWh Savings	therm savings	Fuel Share Adjustment
			BEA	BECT	BIG	CLEO	HP	K-12	PACE NON-RES	PACE RES	TOS Home-owner	TOS Realtor	DEER	eQUEST	Energy Star Calc.	Web	Internal Est.	Engineer Calc.				
1	Install a programmable thermostat	R			X	X	X				X		X	X		X			1800 sf household	261	23	Central Air, Gas Heat
2	Install high efficiency AC systems	R			X	X				X	X			X	X				1800 sf household	674	NA	None
7	Set thermostat to 78 in summer/ 68 in winter	R									X			X					household	778	63	Gas Heat
16	Unplug/turn off appliances not in use	R						X			X	X				X			household	21	NA	None
18	Reduce the use of appliances	R						X						X		X	X		household	334	NA	None
34	Use ceiling fans instead of AC	R									X	X		X		X			household	1,617	NA	None
35	Properly seal and insulate ducts	R					X				X		X	X					household	287	19	Central Air, Gas Heat
37	Purchase energy efficient air conditioner	N	X											X	X				1000sf commercial space	334	NA	None
38a	Purchase energy efficient clothes washer - gas	R				X	X	X		X	X				X				unit	26	9	Gas Water Heat
38b	Purchase energy efficient clothes washer - electric	R					X			X	X				X				unit	258	NA	Electric Water Heat
43	Purchase energy efficient refrigerator	R			X	X	X			X	X				X				unit	100	NA	None
44	Purchase energy efficient refrigerator	N							X						X				unit	1,197	NA	None
45	Purchase energy efficient windows	R			X		X				X			X					1800 sf household	64	14	Central Air, Gas Heat
57	Use high efficiency natural gas furnace	R			X					X				X					1800 sf household	NA	35	None
58	Install attic insulation	R			X	X	X			X	X	X		X					1800 sf household	66	118	Central Air, Gas Heat

Meas #	Measure Description	RES or NON-RES	Program										Source						Unit	kWh Savings	therm savings	Fuel Share Adjustment
			BEA	BECT	BIG	CLEO	HP	K-12	PACE NON-RES	PACE RES	TOS Home-owner	TOS Realtor	DEER	eQUEST	Energy Star Calc.	Web	Internal Est.	Engineer Calc.				
59	Install attic insulation	N							X					X					1800 sf household	-15	7	Central Air, Gas Heat
67	Replace (5) incandescents with CFLs	R									X	X	X				X		household	169	NA	None
70	Install motion detectors on indoor lighting	R				X				X	X					X			household	550	NA	None
72	Switch from T12 to T8 electronic ballast	N							X				X						1000sf commercial space	565	NA	None
78	Install efficient water heating systems	R			X	X	X			X	X		X	X					household	252	10	Water Heat Type
79	Install efficient water heating systems	N							X				X	X					1000sf commercial space	NA	1	Assume Gas Water Heat
86	Take shorter showers	R									X							X	household	348	18	Water Heat Type
88a	Use low flow showerheads	R				X		X		X	X		X						unit	94	8	Water Heat Type
88b	Use low flow faucet aerators	R				X				X	X		X						unit	71	6	Water Heat Type
89	Use water heater blanket	R										X	X	X					household	405	21	Water Heat Type
92	Close fireplace damper	R									X			X		X		X	household	27	2	Central Air, Gas Heat
96	Install LED night light	R				X					X					X	X	X	unit	28	NA	None
97	Install efficient pool pump	R			X					X			X						unit	1,025	NA	None
98	Turn off lights when leaving a room	R						X			X	X				X			household	491	NA	None
99	Reduce air infiltration based on building practices	R			X		X				X			X		X			household	43	7	Central Air, Gas Heat
100a	Install packaged AC units less than or equal to 20 tons	N							X				X						ton cooling capacity	506	NA	None
101	Install EMS	N							x				X						1000sf commercial space	1,237	22	Central Air, Gas Heat

Meas #	Measure Description	RES or NON-RES	Program										Source						Unit	kWh Savings	therm savings	Fuel Share Adjustment
			BEA	BECT	BIG	CLEO	HP	K-12	PACE NON-RES	PACE RES	TOS Home-owner	TOS Realtor	DEER	eQUEST	Energy Star Calc.	Web	Internal Est.	Engineer Calc.				
102	Replace residential ducts	R					X						X	X			X		household	497	38	Central Air, Gas Heat
103	Insulate water heater pipes	R									X		X	X					household	162	8	Water Heat Type
104	Install efficient outdoor lighting	R									X			X		X			unit	133	NA	None
105	Replace (1) incandescent with CFL	R			X	X	X	X		X	X	X	X				X		unit	34	NA	None
106a	Replace dishwasher with ENERGY STAR model - gas	R									X				X				unit	33	2	Gas Water Heat
106b	Replace dishwasher with ENERGY STAR model - electric	R									X				X				unit	74	NA	Electric Water Heat
107	Bring lighting up to code	R		X									X				X		household	133	NA	None
108	Bring water heating up to code	R		X									X				X		household	251	24	Water Heat Type
109	Bring HVAC up to code	R		X									X				X		household	67	12	Central Air, Gas Heat

Note: For BEA, Summit Blue calculated detailed savings for each individual measure mentioned by respondents rather than applying standard savings per measure listed here. A summary of energy savings methods for BEA can be found in the "Measure Information for BEA" section of this Appendix.

Measure Specific Values and Assumptions

Install a programmable thermostat - RESIDENTIAL (SID 1)

Low Savings Estimate

Units	per 1800 square foot residence		
	Measure	**Baseline**	**Savings**
kWh	2712	2694	-18
kW summer	2.161	2.245	0.084
kW all year	2.161	2.245	0.084
therms	231	231.3	-0.163
gallons (water)			
assumed coincidence factor	6.98	6.98	

High Savings Estimate

Units	per 1800 square foot residence		
	Measure	**Baseline**	**Savings**
kWh	2155	2694	539
kW summer	1.796	2.245	0.449
kW all year	1.796	2.245	0.449
therms	185	231.3	46.259
gallons (water)			
assumed coincidence factor	7.30	7.30	

Assumptions

from the DEER 2005 report:

As was shown in the earlier study, the reported behavior of people with and without programmable thermostats does not support the application of programmable thermostats as an energy saving measure. When both heating and cooling are accounted for, energy use increases in nearly all climate zones and in all residential building types.

also note

http://www.fypower.org/res/tools/products_results.html?id=100133

Savings from using a programmable thermostat can be impressive. Recent studies show that proper usage of a programmable thermostat can cut a home or business' heating costs by approximately 25%. In the summer, such devices may shave cooling costs 15 to 25%. Actual savings will depend on such factors as the climate, the amount of insulation in a home or business, the temperature one sets the thermostat and the rate structure of the utility company.

DEER 2005, Average over all climate zones

PER 1800 SQ FOOT HOUSE		
AVERAGE KWH SAVINGS'	-17.863875	DEER 2005
AVERAGE THERMS	-0.16316325	DEER 2005
average KW savings	0.083776838	DEER 2005
AC annual kWh	2,694	eQUEST
AC annual kW	2.245	eQUEST
Space heating annual therms	231.2925	eQUEST
low savings estimate	see DEER results	DEER 2005
high savings estimate	20%	FYP

RESIDENTIAL-Install high-efficiency AC systems (SID 2)

Savings Estimate

Units	per 1800 square foot residence		
	Measure	**Baseline**	**Savings**
kWh	2021	2694	674
kW summer	1.684	2.245	0.561
kW all year	1.684	2.245	0.561
therms			
gallons (water)			
assumed coincidence factor	7.30	7.30	

Assumptions

savings estimate are choice between EnergyStar and standard system
energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/Central_AC_SavCalc.xls -

AC annual kWh	2,694	eQUEST
AC annual kW	2.245	eQUEST
savings estimate	25%	EnergyStar Calculator

Residential AC - Thermostat Settings (SID 7)

Measure Id 7

Measure Desc. Turn thermostat to recommended set points (e.g. 78 for cooling/68 for heating)

source: eQUEST

Estimate

Units	Household					
	Measure		**Base**		**Savings**	
	High	**Low**	**High**	**Low**	**High**	**Low**
kWh	3,456.00	1,203.00	4,451	1,764	995.00	561.00
kW summer	2.70	2.10	3.00	2.40	0.30	0.30
kW all year	2.70	2.10	3.00	2.40	0.30	0.30
therms	193	123	282	158	89.81	35.34
gallons (water)						
assumed coincidence factor						

Assumptions

Mid Rise Commercial Building - Baseline from eQUEST

Base	**kWh**	**kW**	**therms**	
Oakland	1,764	2.40	282.41	<--See eQUEST - Residential Measure 0
Anaheim	4,451	3.00	158.09	<--See eQUEST - Residential Measure 0
Measure	**kWh**	**kW**		
Oakland	1,203	2.10	192.60	<--See eQUEST - Residential Measure 1
Anaheim	3,456	2.70	122.75	<--See eQUEST - Residential Measure 1

Percent Savings		
	High	**Low**
kWh is for Cooling	Anaheim	Oakland
	Cool	Heat
Original Settings	74	68

note that 68 is the default setpoint in the eQUEST model - therefor assume savings percentage same as A/C

Residential Appliances - Turn Off Plug Loads (SID 16)

Measure Id 16

Measure Desc. Turn off plug-loads (small appliances, etc) when not in use

source: Efficient Products.org - Plug Loads

http://www.efficientproducts.org/reports/plugload/Plug_Loads_CA_Field_Research_Report_Ecos_2006.pdf

Estimate

Units	Household				
	Base	**Measure**		**Savings**	
		High	**Low**	**High**	**Low**
kWh	962.1	932.7	948.9	29.4	13.2
kW summer	0.110	0.106	0.108	0.003	0.002
kW all year	0.110	0.106	0.108	0.003	0.002
therms					
gallons (water)					
assumed coincidence factor	1.00	1.00	1.00		

Assumptions

	High	**Low**
Electronic Energy (kWh)	1207	1069.000
Entertainment Percentage		90%
TV		
Standby Draw (kW)	0.0037	0.0009
% Use during Week	34%	13%
Hours on Standyby	5765.76	7600.32
Standyby Power (kWh) per year	21.33	6.84
Computer		
Standby Draw (kW)	0.0018	0.0011
% Use during Week	59%	47%
Hours on Standyby	3581.76	4630.08
Standyby Power (kWh) per year	6.45	5.09
Chargers		
Standby Draw (kW)	0.0018	0.0003
% Use during Week	90%	50%
Hours on Standyby	873.6	4368
Standyby Power (kWh) per year	1.57	1.31
TOTAL	29.35	13.24
coincidence factor	1	1

Residential Appliances - Use Appliances Less (SID 18)

Measure Id 18

Measure Desc. Use appliances less (less TV, etc)

source: Efficient Products.org - Plug Loads

http://www.efficientproducts.org/reports/plugload/Plug_Loads_CA_Field_Research_Report_Ecos_2006.pdf

Low Savings Estimate

Units	per household		
	Measure	**Base**	**Savings**
kWh	3,852	3,931	79
kW summer	0.882	0.900	0.018
kW all year	0.882	0.900	0.018
therms			
gallons (water)			
assumed coincidence factor			

High Savings Estimate

Units	per household		
	Measure	**Base**	**Savings**
kWh	3,341	3,931	590
kW summer	0.765	0.900	0.135
kW all year	0.765	0.900	0.135
therms			
gallons (water)			
assumed coincidence factor			

Assumptions

Misc. Equipment Annual KWh	3,931	eQUEST
Misc. Equipment Annual KW	0.9	eQUEST
Low Savings Estimate	2%	internal estimate
High Savings Estimate	15%	internal estimate

Residential AC - Fans instead of AC (SID 34)

Measure Id 34

Measure Desc. RESIDENTIAL-Use ceiling fans instead of AC

source: http://michaelbluejay.com/electricity/cooling.html

Estimate

Units	Household					
	Measure		**Base**		**Savings**	
	High	**Low**	**High**	**Low**	**High**	**Low**
kWh	1,350.00	900.00	3,841	1,643	2,491.00	742.90
kW summer	0.56	0.56	2.69	2.19	2.13	1.63
kW all year	0.56	0.56	2.69	2.19	2.13	1.63
therms	N/A	N/A	N/A	N/A	N/A	N/A
gallons (water)	N/A	N/A	N/A	N/A	N/A	N/A
assumed coincidence factor	0.75	0.75	0.75	0.75		

Assumptions

Fan Power (kW)	0.1
# of Fans	10
Diversity Factor	0.75 <-- Assume 3/4 of fans on at same time
Coincidence Factor	0.75 <-- Assume 75% chance of 75% of fans on during peak

	High	**Low**	
Daily Hours Fans Used	12	8	<-- Assume on when house is occupied
Annual Fan Energy	1350	900	**<-- Assume 150 days a year**
	Anaheim	**Oakland**	
AC Energy	3,841	1,643	<--- eQUEST
AC Power	2.69	2.19	

Fans can make the temperature seem 10 degrees cooler, tremendously reducing your need for AC. A typical 36" / 48" / 52" ceiling fan uses about 55 / 75 / 90 watts of electricity respectively at the top speed (and the top speed is most efficient for coolin

http://michaelbluejay.com/electricity/cooling.html

The process makes for more even cooling, and just the air movement in the room alone can make it feel cooler by four degrees or more!

http://www.energy.ca.gov/efficiency/home_energy_guide/FANS.PDF

Properly seal and insulate ducts (SID 35)

DEER 2005

Savings Estimate

Units	per household		
	Measure	**Baseline**	**Savings**
kWh	2407	2694	287
kW summer	2.006	2.245	0.239
kW all year	2.006	2.245	0.239
therms	212.2	231.3	19.1
gallons (water)			
assumed coincidence factor			

Assumptions

Baseline = single family home, Long Beach, vintage 1978-1992 (eQUEST model)
electricity savings (A/C) are average of all CZ and vintage for DEER 2005 Measure D03-075
assume central AC and natural gas heating
insulation savings: 2.9% of electricity for A/C, 0.3% of gas for heating
sealing savings: total leakage from 25% to 15% ~savings of 0.1/1.25

Electricity Baseline (kWh)	2,694	eQUEST
Demand Baseline (kW)	2.245	eQUEST
Natural Gas Baseline (therms)	231	eQUEST
Savings from insulation - electricity	2.90%	DEER 2005
Savings from insulation - natural gas	0.30%	DEER 2005
Savings from duct sealing	8.0%	judgement, based on above leakage assumptions

COMMERCIAL-purchase ENERGY STAR®-qualified or energy efficient air conditioners (SID 37)

DEER 2005

Estimate - Electric Hot Water

Units	per 1000 square feet of commercial space		
	Measure	**Baseline**	**Savings**
kWh	1,892	2,226	334
kW summer	1.156	1.360	0.204
kW all year	1.156	1.360	0.204
therms			
gallons (water)	5790	12768	6978
assumed coincidence factor	0.10		

Assumptions

energy efficient chiller is, on average, 15% more efficient than standard chiller

Annual AC kWh	2,226
Annual AC kW	1.35978
Savings Estimate	15%

RESIDENTIAL-Purchase ENERGY STAR®-qualified or energy efficient clothes washer (SID 38)

http://www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/CalculatorConsumerClothesWasher.xls

Estimate - Gas Hot Water

Units	residential clothes washing machine		
	Measure	**Baseline**	**Savings**
kWh	56	82	26
kW summer	0.0006	0.0009	0.0003
kW all year	0.0006	0.0009	0.0003
therms	20.7	29.5	9
gallons (water)	5790	12768	6978
assumed coincidence factor	0.10		

Estimate - Electric Hot Water

Units	residential clothes washing machine		
	Measure	**Baseline**	**Savings**
kWh	562	820	258
kW summer	0.0064	0.0094	0.0029
kW all year	0.0064	0.0094	0.0029
therms			
gallons (water)	5790	12768	6978
assumed coincidence factor	0.10		

Assumptions

	EnergySta	**Standard**	
gas hot water, annual kWh	56.2	82	EnergyStar Calculator
gas hot water, annual therms	20.7	29.5	EnergyStar Calculator
electric hot water, annual kWh	562	820	EnergyStar Calculator
loads per year	392	392	EnergyStar Calculator

Residential - Purchase ENERGY STAR®-qualified or energy efficient refrigerator (SID 43)

Estimate

Units	per household refrigerator		
	Measure	**Baseline**	**Savings**
kWh	540	640	100
kW summ	0.0925	0.1096	0.017
kW all ye	0.0925	0.1096	0.0171
therms			
gallons (water)			
assumed coincidence factor	1.5	1.5	

Assumptions

25 cubic foot refrigerator

	Measure	Base	
annual kWh	540	640	EnergyStar Calculator
CF	1.5		internal estimate

note: interaction with AC not considered here

COMMERCIAL-Purchase ENERGY STAR®-qualified or energy efficient refrigerator (SID 44)

Estimate

Units	44 square foot commercial refrigerator		
	Measure	**Baseline**	**Savings**
kWh	2,351	3,548	1,197
kW summer	0.4026	0.6075	0.205
kW all year	0.4026	0.6075	0.2050
therms			
gallons (water)			
assumed coincidence factor	1.5		

Assumptions

44 cubic foot refrigerator

	Measure	Base	
annual kWh	2351	3548	EnergyStar Calculator
CF	1.5		internal estimate

note: interaction with AC not considered here

RESIDENTIAL-purchase ENERGY STAR®-qualified or energy efficient windows (SID 45)

Low Savings Estimate

Units	per 1800 square foot household		
	Measure	**Baseline**	**Savings**
kWh	1,248	1,270	21
kW summer	3.8600	3.9275	0.0675
kW all year	3.8600	3.9275	0.0675
therms	141.1	145.82	4.7200
gallons (water)	0	0	0
assumed coincidence factor			

High Savings Estimate

Units	per 1800 square foot household		
	Measure	**Baseline**	**Savings**
kWh	1,248	1,355	107
kW summer	3.8600	4.1975	0.3375
kW all year	3.8600	4.1975	0.3375
therms	141.1	164.7	23.6000
gallons (water)	0	0	0
assumed coincidence factor			

Assumptions

Low Savings Estimate - purchase Energy Star windows instead of standard double pane
High Savings Estimate - early replacement of single pane windows
High Savings Base and Measure Estimates - eQUEST model
eQUEST multi-family residence, 1800 sq. ft, direct expansion cooling, gas furnace
Low Savings -
savings from double pane to double pane, low e is approximately 20% of savings from single pane to double pane
http://www.energystar.gov/index.cfm?c=windows_doors.pr_savemoney

	Double Low-E	Single PPG	Double Pane, Standard
kWh			
Santa Monica	862.3	943.9	878.62
Sacramento	2060	2250	2098
Oakland	571.3	627.4	582.52
Anaheim	1500	1600	1520
average	1248.4	1355.325	1269.785
kW			
Santa Monica	3.02	3.38	3.092
Sacramento	4.92	5.37	5.01
Oakland	3.53	3.53	3.53
Anaheim	3.97	4.51	4.078
average	3.86	4.1975	3.9275
therms			
Santa Monica	77.6	94.2	80.92
Sacramento	231.2	264	237.76
Oakland	174.2	203.9	180.14
Anaheim	81.4	96.7	84.46
average	141.1	164.7	145.82
ratio of savings :	0.20		

Use HE natural gas furnace (92% AFUE or higher) (SID 57)

see SID 55

Savings Estimate - Space Heating

Units	per 1800 square foot residence		
	Measure	**Baseline**	**Savings**
kWh			
kW summer			
kW all year			
therms	196	231	35.197
gallons (water)			
assumed coincidence factor			

Assumptions

Heating

AFUE - base	0.78	1992 federal minimum
AFUE - measure	0.92	ACEEE recommends AFUE > 0.90

	Measure	Base
Space Heating annual therms	196.0958	231.2925

RESIDENTIAL-Insulate Home with Attic Insulation (SID 58)

Savings Estimate

Units	per 1800 square foot household		
	Measure	**Baseline**	**Savings**
kWh	1,254	1,320	66
kW summer	3.763	4.300	0.538
kW all year	3.763	4.300	0.538
therms	141.2	259.0	117.8
gallons (water)			
assumed coincidence factor			

Assumptions

couldn't use DEER because baseline assumes insulation for all building vintages
eQUEST: measure = R-38 (eQUEST default), base = no ceiling insulation

	Measure	**Baseline**
kWh		
Santa Monica	882.3	866.3
Sacramento	2067	2250
Oakland	571.3	603.4
Anaheim	1495	1560
average	1,254	1319.925
kW		
Santa Monica	3.020	3.330
Sacramento	4.950	5.490
Oakland	3.160	3.810
Anaheim	3.920	4.570
average	3.763	4.300
therms		
Santa Monica	77.6	171.2
Sacramento	231.8	376.1
Oakland	174.2	315.1
Anaheim	81.4	173.7
average	141.2	259.0

COMMERCIAL-Insulate Building with Attic Insulation (SID 59)

eQUEST modeling

note that cooling loads increase slightly

Savings Estimate

Units	per 1000 square feet of commercial space		
	Measure	**Baseline**	**Savings**
kWh	2,226	2,211	-15
kW summer	1.221	1.229	0.007
kW all year	1.221	1.229	0.007
therms	16.2	22.9	6.8
gallons (water)			
assumed coincidence factor	4.8	4.8	

Assumptions

default mid-rise office building with and without attic insulation, Long Beach, CA

exterior insulation: 3 inch polyurethane (R-18) and R-19 Roof Batt plus radiant barrier

	with insulation	without insulation
Space Cooling kWh x 1000	299	297
Space Cooling kW	164	165
Space Heating Mbtu	217	308
per 1000 sq ft		
Space Cooling (kWh)	2392	2376
Space Cooling (kW)	1.312	1.32
Space heating (therms)	17.36	24.64
average cooling load (kWh)	2,226	eQUEST
per 1000 sq ft, scaled to average load		
Space Cooling (kWh)	2226.2	2211.30903
Space Cooling (kW)	1.221059532	1.228505017
Space heating (therms)	16.15670234	22.93209365

Incandescent to CFL - RESIDENTIAL (SID 67)

SOURCE: DEER 2005 Report, P. 2-5

16W Screw-in CFL (DEER 03-805), assume five bulbs swapped per house

Estimate

Units	replacement of 5 x 60 Watt Incandescent		
	Measure	**Baseline**	**Savings**
kWh	61	230	169
kW summer	0.006	0.022	0.072
kW all year	0.006	0.022	0.016
therms	0	0	0
gallons (water)			
assumed coincidence factor	0.83		

Assumptions

		source
60	Watts, incandescent bulb	DEER 2005
16	Watts, CFL	DEER 2005
33.8	kWh savings per lamp	DEER 2005
0.0032	kW savings per lamp	DEER 2005
46.1	implied baseline load (kWh), per lamp	calculation
12.3	implied measure load (kWh), per lamp	calculation
5.0	assumed # of bulbs being replaced	internal estimate

note discrepancy between DEER and eQUEST kWh/kW ratio (see SID 64)

Residential Lighting - Motion Detectors (SID 70)

Measure Id 70

Measure Desc. Install motion detectors on indoor lighting

source: Residential Energy Consumption Survey

http://www.eia.doe.gov/emeu/recs/recs2001/enduse2001/enduse2001.html

Estimate

Units	Household				
	Base	**Measure**		**Savings**	
		High	**Low**	**High**	**Low**
kWh	846	212	381	635	465
kW summer	0.093	0.023	0.042	0.070	0.051
kW all year	0.093	0.023	0.042	0.070	0.051
therms					
gallons (water)					
assumed coincidence factor	0.20	0.20	0.20		
assumed diversity factor	0.8	0.8	0.8		

Assumptions

Annual Lighting Energy/household	940	kWh		**<--RECS**
%Interior	90%			
Hours of Operation	4	hours		<--- Minnesota Energy
Household Lighting Power	0.58	kW		
% of Lights with Controls	50%			<----- Assumption support
	High		Low	
% On when Unoccupied	50%		10%	<--- Need Source
Coincidence Factor	0.2			
Diversity Factor	0.8			

Use T-8 & Electronic Ballast (SID 72)

source: DEER 2005

Assume this is a switch from T12 magnetic (40 W) to T8 Electronic (32 W)

assume same number of hours of operation as the interior lighting above (3296)

Estimate

Units	per 1000 ft2 of commerical space		
	Measure	**Baseline**	**Savings**
kWh	2,260	2,825	565
kW summer	0.848	1.060	0.212
kW all year	0.848	1.060	0.212
therms	0	0	0
gallons (water)			
assumed coincidence factor	3.29		

Assumptions

swtich from T12 lamps with magnetic ballast ot T8s with electronic ballasts

	measure	base	
bulb wattage	32	40	DEER 2005
lighting intensity (W/sq ft)	1.5	1.875	internal estimate
annual hours of operation	2808	2808	DEER 2005
annual kWh per 1000 square feet	4212	5265	calculation

lighting kWh	2,825	eQUEST
lighting kW	1.0596	eQUEST
CF	3.28593	calculation

RESIDENTIAL-Install efficient water heating systems (SID 78)

Estimate - electric water heater

Units	per household		
	Measure	**Baseline**	**Savings**
kWh	4,431	4,683	252
kW summer	0.759	0.802	0.043
kW all year	0.759	0.802	0.043
therms			
gallons (water)			
assumed coincidence factor	1.50	1.50	

Estimate - gas water heater

Units	per household		
	Measure	**Baseline**	**Savings**
kWh			
kW summer			
kW all year			
therms	197.3619	207.23	9.868
gallons (water)			
assumed coincidence factor			

Estimate - point of use gas instead of standard gas water heater

Units	per household		
	Measure	**Baseline**	**Savings**
kWh			
kW summer			
kW all year			
therms	180.2	207.23	27.030
gallons (water)			
assumed coincidence factor			

Assumptions

	Measure	Base	kWh savin	kW savings	kBtu savin	therm savings	
EF - electric	0.93	0.88	149.0462	0.032790171	0	0	DEER 2005
EF - gas	0.63	0.6	0	0	927.5	9.275	DEER 2005
EF - gas to point o	0.69	0.6	0	0	2782.5	27.825	DEER 2005

eQUEST model therms for water heating	207.23
scale DEER results to eQUEST model	1.68912

Implied KWh

electric	2623.214	2772.26
gas	0	0
gas to POU	0	0

Implied KW

electric	0.577107	0.609897
gas	0	0
gas to POU	0	0

Implied Therms

electric	0	0
gas	116.843	122.6852
gas to POU	106.6828	122.6852

Install Efficient Water Heating System - COMMERCIAL (SID 79)

DEER measure D03-911- High efficiency water heater (EF = 0.64) replaces standard efficiency water heater (EF = 0.594)

Estimate - Natural Gas System

Units	per 1000 ft2 of commerical space		
	Measure	**Baseline**	**Savings**
kWh			
kW summer			
kW all year			
therms	15.3	16.5	1.2
gallons (water)			
assumed coincidence factor			

Assumptions

for a midrise office building, per 1000 sq ft

VALUE	UNITS	SOURCE
0.59	EF, standard	DEER 2005
0.64	EF, high efficiency	conversion
1647.2	baseline load, kBtu	eQUEST
16.5	baseline load, therms	conversion

Residential Showers - Taking Shorter Showers (SID 86)

Measure Id 86
Measure Desc. Take Shorter Showers
source: Minnesota Energy Challenge
www.mnenergychallenge.org/pdf/calculations.pdf

Electric Water Heating

Units	Household				
	Measure	**Base**		**Savings**	
		High	**Low**	**High**	**Low**
kWh	958	1,306	1,306	522	174
kW summer	0.033	0.045	0.045	0.018	0.006
kW all year	0.0328	0.045	0.045	0.018	0.006
therms	N/A	N/A	N/A	N/A	N/A
gallons (water)	N/A	N/A	N/A	N/A	N/A
assumed coincidence factor	0.30	0.30	0.30	0.30	0.30

Gas Water Heating

Units	Household				
	Measure	**Base**		**Savings**	
		High	**Low**	**High**	**Low**
kWh					
kW summer					
kW all year					
therms	49.0	66.9	66.9	26.7	8.9
gallons (water)					
assumed coincidence factor					

Assumptions

energy savings (GWh) per day per minute of reduction	53	[1]
US Population	288,860,000	[2]
# of people per household	2.6	[2]
# of households	111,100,000	[2]
energy savings per household per day (kWh)	0.477	calculated
energy savings per household per year (kWh)	174	calculated
gas water heater efficiency	0.6	estimate
electric water heater efficiency	0.9	estimate
kWh per therm (conversion factor)	29.3	
energy savings per household per year (therms)	8.9	calculated
average shower length (minutes)	7.5	[need source]
shower reduction (minutes) - LOW	1	estimate
shower reduction (minutes) - HIGH	3	estimate

References

[1] "Potential Water and Energy Savings from Showerheads", Peter J. Biermayer, Lawrence Berkeley National Laboratory, 2005, LBNL 58601

[2] http://factfinder.census.gov/servlet/NPTable?_bm=y&-qr_name=ACS_2005_EST_G00_NP01&-geo_id=01000US&-ds_name

Use low flow shower heads - RESIDENTIAL (SID 88a)

Estimate - electric water heater

Units	per showerhead		
	Measure	**Baseline**	**Savings**
kWh			94
kW summer			0.021
kW all year			0.021
therms			
gallons (water)			
assumed coincidence factor			

Estimate - gas water heater

Units	per showerhead		
	Measure	**Baseline**	**Savings**
kWh			
kW summer			
kW all year			
therms			7.7
gallons (water)			
assumed coincidence factor			

Assumptions

average of all residential entries for DEER D03-934

kWh	94	[1]
kW	0.021	[1]
therms	7.72	[1]

References

[1] DEER 2005, MeasureID D03-937

Use low flow faucet aerators - RESIDENTIAL (SID 88b)

Estimate - electric water heater

Units	per household		
	Measure	Baseline	Savings
kWh			71
kW summer			0.016
kW all year			0.016
therms			
gallons (water)			
assumed coincidence factor			

Estimate - gas water heater

Units	per household		
	Measure	Baseline	Savings
kWh			
kW summer			
kW all year			
therms			5.8
gallons (water)			
assumed coincidence factor	1.50	1.50	

Assumptions

average of all residenti		Source
kWh	71	[1]
kW	0.016	[1]
therms	5.8	[1]

References

[1] DEER 2005, MeasureID D03-934

Use water heater blanket (SID 89)

source: DEER 2005 Report, P. 2-20)

Estimate - Natural Gas System

Units	per household		
	Measure	**Baseline**	**Savings**
kWh			
kW summer			
kW all year			
therms	186.5	207.2	20.7
gallons (water)			
assumed coincidence factor			

Estimate - Electric System

Units	per household		
	Measure	**Baseline**	**Savings**
kWh	3643	4048	405
kW summer	0.624	0.693	0.069
kW all year	0.624	0.693	0.069
therms			
gallons (water)			
assumed coincidence factor	1.50	1.50	

Assumptions

energy savings from pipe wrap	0%	this measure is just the blanket
energy savings from water heater blanket	10%	DEER 2005
baseline load (kBtu)	20,723	eQUEST
baseline load (therms)	207.23	conversion

EF Gas System	0.6	internal estimate
EF Electric System	0.9	internal estimate
Electric Load (kWh)	4047.893	calculation

Residential Weatherization - Closing Damper (SID 92)

Measure Id 92
Measure Desc. Close Fireplace Damper
source: Minnesota Energy Challenge
www.mnenergychallenge.org/pdf/calculations.pdf
source: Appendix C1: ASHRAE Table of Residential Leakage Data (ASHRAELA.lb3)
http://www.bfrl.nist.gov/IAQanalysis/CONTAM/table00_arld.htm
source: Energy Audit of Building systems - Moncef Krarti

Estimate

Units	Household		
	Measure	**Base**	**Savings**
kWh	2,694.35	2,694.35	0.00
kW summer	2.245	2.245	0.000
kW all year	2.245	2.245	0.000
therms	231.29	231	0.00

Assumptions

Assume Gas Heat, Electric Cooling

Stack Coefficient	0.0156	One Story House	<--Krarti
Wind Coefficient	0.0065	Moderate Shielding	<--Krarti
Indoor Temp	70		
Wind Speed	10	mph	
Specfic Heat of Air	1.08	Btu/(cfm*hr*F)	

	Maximum	**Minimum**	
Damper Opening (sq in)	7.44	4.34	<--ASHRAE
Heating			
Outdoor Temp	48	55	<--- Weather Data
CFM	7.415	4.081	
Hours	240		
Coincidence Factor	0		
Cooling			
Outdoor Temp	79	75	<--- Weather Data
CFM	6.614	3.703	
Hours	1080		
Coincidence Factor	1		

Annual AC kWh	2,694	eQUEST
Annual AC kW	**2.25**	eQUEST
Annual Heating therms	231.2925	eQUEST
Savings	1%	approximate savings from above calculations

LED Night Lights (SID 96)

Engineering Calculation

Savings Estimate			
Units	per night light		
	Measure	**Baseline**	**Savings**
kWh	4.75	33.22	28
kW summer			
kW all year			
therms			
gallons (water)			
assumed coincidence factor			

Assumptions		
Incandescent Night Light Wattage	7	[1]
LED Night Light Wattage	1	[2]
daily hours of use (annual average)	13	estimate*

**assume night lights have photo-control for auto-on dusk to dawn*

Refrences

[1] Home Depot Online Catologue #100646775, Amerelle Faceted Nite Lite, 7W Bulb, White

[2] Overstock Drugstore, MaxLite 1 watt 120 volt LED Maxlite Night Light, http://www.overstockdrugstore.com/products/1-watt-120-volt-LED-Maxlite-Night-Light.html?prodid=8750&utm_source=GoogleBase&utm_medium=PE&utm_campaign=GoogleBase&cvsfa=1950&cvsfe=2&cvsfp=8750

Pool Pumps (SID 97)

DEER 2005

Savings Estimate

Units	per night light		
	Measure	**Baseline**	**Savings**
kWh			1025
kW summer			0.322
kW all year			0.322
therms			0.000
gallons (water)			
assumed coincidence factor			

Assumptions

Savings from single speed to single speed efficient, 1.5 HP

kWh	650	**[1]**
kW	0.104	**[1]**

Savings from single speed to double speed efficienct, 1.5 HP

kWh	1400	[2]
kW	0.54	[2]

References

[1] DEER 2005, MeasureID D03-966

[2] DEER 2005, MeasureID D03-967

Turning Off Lights When Leaving Room - Residential (SID 98)

Analysis for Government Partnership residential energy audit survey

Savings Estimate

Units	per household		
	Measure	**Baseline**	**Savings**
kWh			491
kW summer			0.040
kW all year			0.040
therms			-0.760
gallons (water)			
assumed coincidence factor			

Assumptions

residential savings is average from analysis of survey responses to Community Youth Energy Services (CYES) residential energy audit survey for Government Partnerships contract. It accounts for lamp types, quantities, and room types.

kWh	491 **[1]**
kW	0.04 **[1]**
therms	-0.76 **[1]**

references

[1] SBC analysis of CYES residential energy audit survey for Government Partnerships contract.

Reducing air infiltration based on building practices - Residential (SID 99)

DEER 2005

Estimate

Units	Household		
	Measure	**Base**	**Savings**
kWh	2,425	2,694	269
kW summer	2.021	2.245	0.225
kW all year	2.021	2.245	0.225
therms	208	231	23

Assumptions

Assume same savings as SID 90 : Residential AC - Close Door sand Windows.

Packaged AC - units less that or equal to 20 tons - Commerical (SID 100a)

DEER 2008

Savings Estimate

Units	per ton of cooling capacity		
	Measure	**Baseline**	**Savings**
kWh			506
kW summer			0.192
kW all year			0.192
therms			
gallons (water)			
assumed coincidence factor			

Assumptions

DEER 2008, SDG&E CZ and Vintage average, large office building

unweighted average of customer and code cases, unweighted average of EER or SEER values

kWh 506

kW 0.192

references

[1] DEER 2008, averaging of all packaged AC unit commercial measures

Controls - EMS - Commercial (SID 101)

DEER 2005

Savings Estimate

Units	per 1,000 square feet of floor space		
	Measure	**Baseline**	**Savings**
kWh			1237
kW summer			0.369
kW all year			0.369
therms			22.066
gallons (water)			
assumed coincidence factor			

Assumptions

DEER 2005, Measure ID D03-072, comprehensive EMS

large office building, unweighted average of vintage, population weighted average of climate zones

kWh	1,237
kW	0.37
therms	22.07

references

[1] DEER 2005, MeasureID D03-072, "CHW & HW reset, heating/cooling timeclocks, reduced nighttime lighting levels"

Replace residential ducts (SID 102)

DEER 2005

Savings Estimate

Units	per household		
	Measure	**Baseline**	**Savings**
kWh	2198	2694	497
kW summer	1.831	2.245	0.414
kW all year	1.831	2.245	0.414
therms	193.7	231.3	37.6
gallons (water)			
assumed coincidence factor			

Assumptions

Baseline = single family home,
Long Beach, vintage 1978-1992
(eQUEST model)
electricity savings (A/C) are average of all CZ and vintage for DEER 2005 Measure D03-075
assume central AC and natural gas heating
old ducts weren't insulated - insulation savings: 2.9% of electricity for A/C, 0.3% of gas for heating
sealing savings: total leakage from 35% to 15% ~savings of 0.2/1.25

Electricity Baseline (kWh)	2,694	eQUEST
Demand Baseline (kW)	2	eQUEST
Natural Gas Baseline (therms)	231	eQUEST
Savings from insulation - electricity	2.90%	DEER 2005
Savings from insulation - natural gas	0.30%	DEER 2005
Savings from duct sealing	16.0%	judgement, based on above leakage assumptions

Insulate Water Pipes - RESIDENTIAL (SID 103)

source: DEER 2005
Report, P. 2-20)

Estimate - Natural Gas System

Units	per household		
	Measure	**Baseline**	**Savings**
kWh			
kW summer			
kW all year			
therms	198.9	207.2	8.3
gallons (water)			
assumed coincidence factor			

Assumptions

4%	energy savings from pipe wrap	DEER 2005
10%	energy savings from water heater blanket	DEER 2005
20,723	baseline load (kBtu)	eQUEST
207.23	baseline load (therms)	conversion

Efficient Outdoor Lighting (SID 104)

see SID 42,
assume one
outdoor fixture

Energy Star Calculator:
http://www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/Consumer_RLF_Sav_Calc.xls

from Energy Start Calculator

Estimate			
Units	2 indoor lighting fixtures		
	Measure	**Baseline**	**Savings**
kWh	66	199	133
kW summer	0.0254	0.0766	0.0512
kW all year	0.0254	0.0766	0.0512
therms	0	0	0.0000
gallons (water)	0	0	0
assumed coincidence factor	3.37		

EnergyStar Qualified Units			
indoor unit	30	kWh/yr	LBNL 2007
outdoor unit	66	kWh/yr	LBNL 2007
Convential Unit			
indoor unit	117	kWh/yr	LBNL 2007
outdoor unit	199	kWh/yr	LBNL 2007
from eQUEST			
Residential Lighting	2,390	kWh/yr	eQUEST
Residential Lighting	0.92	kW peak	eQUEST
ratio kWh/kW	2597.663	kWh/kW	

number of indoo 0
number of outdo 1

assume kWh / kW ratio from eQUEST

Incandescent to CFL - RESIDENTIAL (SID 105)

SOURCE: DEER 2005 Report, P. 2-5

16W Screw-in CFL (DEER 03-805), assume one bulb swapp

Estimate

Units	replacement of 5 x 60 Watt Incandescent		
	Measure	**Baseline**	**Savings**
kWh	12	46	34
kW summer	0.001	0.004	0.072
kW all year	0.001	0.004	0.003
therms	0	0	0
gallons (water)			
assumed coincidence factor	0.83		

Assumptions

		source
60	Watts, incandescent bulb	DEER 2005
16	Watts, CFL	DEER 2005
33.8	kWh savings per lamp	DEER 2005
0.0032	kW savings per lamp	DEER 2005
46.1	implied baseline load (kWh), per lamp	calculation
12.3	implied measure load (kWh), per lamp	calculation
1.0	assumed # of bulbs being replaced	internal estimate

note discrepancy between DEER and eQUEST kWh/kW ratio (see SID 64)

Residential Dishwasher: EnergyStar instead of Standard (SID 106)

ask - gas heating or electric heating

http://www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/CalculatorConsumerDishwasher.xls

Estimate - Electric Water Heating

Units	residential dishwasher		
	Measure	**Baseline**	**Savings**
kWh	294	368	74
kW summer	0.0034	0.0042	0.0008
kW all year	0.0034	0.0042	0.0008
therms	0	0	0
gallons (water)	860	1290	430
assumed coincidence factor	0.10		

Assumptions

	EnergySta	**Standard**	
			EnergyStar Calculator
			EnergyStar Calculator
electric hot water, annual kWh	294	368	EnergyStar Calculator
loads per year	215	215	EnergyStar Calculator
coincidence factor	0.1		internal estimate

Estimate - GasWater Heating

Units	residential dishwasher		
	Measure	**Baseline**	**Savings**
kWh	134	167	33
kW summer	0.0015	0.0019	0.0004
kW all year	0.0015	0.0019	0.0004
therms	7.3	9.2	2
gallons (water)	860	1290	430
assumed coincidence factor	0.10		

Assumptions

	EnergySta	**Standard**	
gas hot water, annual kWh	134	167	EnergyStar Calculator
gas hot water, annual therms	7.3	9.2	EnergyStar Calculator
			EnergyStar Calculator
loads per year	215	215	EnergyStar Calculator
coincidence factor	0.1		internal estimate

Bringing lighting up to code (SID 107)

Estimate

Units	household		
	Measure	**Baseline**	**Savings**
kWh	667	800	133
kW summer			
kW all year	0.193	0.232	0.039
therms			
gallons (water)			
assumed coincidence factor			

Assumptions

Baseline = assume new construction to lighting code at 90% compliant
Measure = customer is 100% compliant with code

NOTE- DEER NEW CONSTRUCTION BASELINE NOT USED BECAUSE IT'S ~2000 KWH PER YEAR (RELATIVELY UNCHANGED FROM CUSTOMER AVERAGE BASELINE AND FROM STUDIES IN 1990'S, WHERE AS TITLE 24 STANDARDS HAVE EFFECTIVELY BANNED INCANDESCENTS AND OTHER LOW EFFICACY LAMPS/LUMINNAIRES
haven't found a good reference for lighting load in Title 24 2005 compliant homes, or even Energy Star Homes.

assume baseline for Title 24 2005 compliant home is 1/3 of customer average baseline (assumes lighting in customer average is primarily incandescent)
HVAC interaction effects were not considered in this estimate

	kWh	**kW***
customer average	2000	0.580
new construction (100% compliant)	667	0.193
90% compliant, 10% customer average	800	0.232
savings from going from 90% to 100% compliant	133	0.039

**assume kW/kWh ratio for baseline end-use lighting load in DEER 2005 for new construction, PG&E territory*

Bringing water heating up to code (SID 108)

Estimate			
Units	household		
	Measure	**Baseline**	**Savings**
kWh	3,397	3,647	250
kW summer			
kW all year	0.793	0.829	0.036
therms	169	193	24
gallons (water)			
assumed coincidence factor			

Assumptions

Baseline = assume new construction to code
Measure = additional tank and hot water pipe insulation
Data Source = DEER 2008 update

Analysis

use 50 gallon storage t tank insulation will reduce standby losses (tankless eliminates standby losses)
assume insulation redı pipe insulation will reduce the tank temperature required
assume insulation in pipes enables a 1 degF reduction in water heater setpoint

Assumptions

savings from pipe insulation	1.5%	assume delta T of tank goes from 65 degF to 64 degF
portion of savings from tankless realized from tank insulation	33%	

	baseline	**load with tankless**	**impact for tankless**	**assumed impact for added tank insulation**	**load with insulation**	**additional impact for pipe insulation**	**measure**	**impact**
annual therms	193	128	65	22	171	3	169	24
OR								
annual kWh	3,647	3,055	592	197	3,450	53	3,397	251
annual kW	0.829	0.757	0.072	0.024	0.805	0.012	0.793	0.036

DEER 2008 Residential Hotwater, new construction, PG&E territory

Bringing HVAC up to code (SID 109)

Estimate

Units	household		
	Measure	**Baseline**	**Savings**
kWh		1,335	67
kW summer			0
kW all year		2.300	0.12
therms		242	12
gallons (water)			
assumed coincidence factor			

Assumptions

Residential Loads for PG&E Territory

baseline HVAC loads for PG&E territory (population weighted average of PG&E territories), single family new construction

	BASELINE		
	kWh	kW	therms
heating			242
cooling	1,050	2.0	
ventilation	285	0.3	

Assume 5% savings from baseline

Source: Deer 2008

Measure Information for BEA

Responses for 52 respondents were provided to Summit Blue. Of these, 26 respondents had quantifiable savings from measures across a variety of different end-uses, as described below.

LIGHTING -

Thirty-three respondents reported taking actions; quantifiable savings were estimated for eleven of these. Savings were attributed to all three measures reported from the survey and an "Other" category.

Savings estimates were primarily determined by mapping claimed actions to existing measures in the Database for Energy Efficiency Resources (DEER). Where possible, engineering algorithms were used directly to determine savings. For some measures, percentage savings from DEER or from self-reporting were applied to baseline end-use intensities reported in the California Commercial End-use Survey (CEUS).

HVAC -

Eighteen respondents reported taking actions; quantifiable savings were estimated for seven of these, including four respondents without technical knowledge. Savings were attributed to three of the six measures reported from the survey and an "Other" category; no savings were quantified for "Optimized pumps and fans," "Upgraded gas equipment," or "Optimized economizers."

Savings estimates were primarily determined by mapping claimed actions to existing measures in the DEER. In some cases, savings were calculated by applying percentage savings estimates from DEER or from literature review to baseline end-use intensities reported in CEUS.

REFRIGERATION -

Of the seven respondents, none had technical knowledge. Based on open-ended responses, savings were calculated for one respondent by applying a percentage savings estimate to baseline end-use intensity reported in CEUS. As a result, savings were not directly attributed to any of the survey measures.

BOILERS -

Only two respondents reported taking actions; quantifiable savings were calculated for one of these. Savings were attributed to one of the three measures reported from the survey; no savings were quantified for "Modified existing plumbing system" or "Installed new or upgraded water heaters and boilers."

Savings estimates were determined through a combination of using an engineering algorithm directly to determine savings, applying a percentage savings from DEER to baseline end-use intensity estimated from DEER 2008, or applying a percentage savings from self-reporting to baseline end-use intensities from DEER 2008.

COMPRESSED AIR -

Only two respondents reported taking actions; quantifiable savings were calculated for one of these, with the other respondent's reported action not resulting in any savings. Savings were attributed to both measures reported from the survey.

Savings estimates were determined by applying a percentage savings from literature to baseline end-use intensity estimated from the self-reported survey responses and engineering algorithms.

DRYERS -

Only two respondents reported taking actions; quantifiable savings were estimated for both of these, including one respondent without technical knowledge. Savings were attributed to one of the two measures reported from the survey and an "Other" category; no savings were quantified for "Improved dryer system controls."

Savings estimates were determined through literature review.

BUILDING ENVELOPE -

Of these seven respondents, none had technical knowledge and none provided sufficient information for estimating savings. Thus, no savings were quantified for this end-use.

ALL END-USES -

In many cases, respondents reported taking multiple, overlapping actions. Efforts were made to attribute savings across the multiple measures without double-counting impact.

No building type information was asked about in this survey. Thus, all buildings were assumed to be either a small office or a large office, depending on whether they were smaller or larger than 25,000 square feet.

A significant number of the respondents in this survey did not have technical knowledge of the changes made. Savings were not quantified for these respondents, unless they provided open-ended answers about additional changes they made with sufficient information to develop a savings estimate.

Some respondents without technical knowledge reported taking some action, but did not identify the specific action taken within a measure category. The action code assigned to these respondents, for the specific measures within the measure category, was "5 - reported, insufficient information."

Additional Reference Information

Fuel Shares by Utility

	Residential			Commercial	
	PG&E	SCE/SCG	SDG&E	SCE	SDG&E
Percent Gas Water Heating	0.74	0.85	0.76	0.58	0.58
Percent Electric Water Heating	0.09	0.05	0.05	0.47	0.53
Percent Gas Heating	0.74	0.85	0.74	0.5	0.47
Percent Electric Heating	0.1	0.06	0.13	0.38	0.54
Percent central air	0.39	0.48	0.35	0.66	0.71

Sources:

California Statewide Residential Appliance Saturation Study Final Report; California Energy Commission Consultant Report; Number 400-04-009; June 2004; KEMA-XENERGY, Itron, Roper ASW

California Commercial End-Use Survey; California Energy Commission Consultant Report; CEC-400-2006-005; March 2006; Itron

Carbon Dioxide Reduction References

Electric

Conversion	1083.02 lb CO2/MWh
Source	Annual non-baseload output emission rates for eGRID subregion WECC California; 1 metric ton=2204.6 lb
Notes	http://www.epa.gov/cleanenergy/documents/egridzips/eGRID2007V1_1_year05_GHGOutputRates.pdf

Natural Gas

Conversion	0.005 metric tons CO2/therm
Notes	This is not a California-specific number
Source	http://www.epa.gov/RDEE/energy-resources/refs.html

Energy Savings Spreadsheets by Program

Program Number:	SDGE 3032
Program Name:	K-12 Energy Efficiency Education
Last Updated:	1/7/2010
Updated by:	AAW

Total respondents	61
Total population for extrapolation	N/A
Total population reached	12,116

Fuel Share	SDG&E
Percent Gas Water Heating	0.76
Percent Electric Water Heating	0.05
Percent Gas Heating	0.74
Percent Electric Heating	0.13
Percent central air	0.35

Measure	Measure Number	Unit	n	Square Foot Avg	n adjusted	kWh Unit savings			Therm Unit savings			MWh savings			Therm Savings		
						Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
CFL	105	house	312		312.00	16.90	33.80	50.70				5.273	10.546	15.818	-	-	-
turn lights off when we leave a room	98	house	53		53.00	245.50	491.00	736.50				13.012	26.023	39.035	-	-	-
reduce the use of appliances	18	1800sf	48		48.00	78.62	334.14	589.66				3.774	16.039	28.304	-	-	-
unplug/turn off apppliances not in use	16	1800sf	4		4.00	13.24	21.30	29.35				0.053	0.085	0.117	-	-	-
ENERGY STAR washer	38	unit	1		1.00	12.90	25.80	38.70	4.40	8.80	13.20	0.013	0.026	0.039	4.400	8.800	13.200
Low flow showerheads	88a	house	1		1.00	47.02	94.05	141.07	3.86	7.72	11.58	-	-	-	3.859	7.718	11.577
water conservation	NO SAVINGS		2														
walking/less driving	NO SAVINGS		4														
recycle	NO SAVINGS		2														
Gross Total												*22*	*53*	*83*	*8*	*17*	*25*
Level of Influence	1.00																
Net Total												*22.12*	*52.72*	*83.31*	*8.26*	*16.52*	*24.78*
Per Participant Savings												*0.4*	*0.9*	*1.4*	*0.1*	*0.3*	*0.4*
Extrapolated Savings												*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
CO2 Emission reductions	0.49 metric tons CO2 per megawatt hour delivered					0.005 metric tons CO2 per therm						11	26	41	0.04	0.08	0.12

Program Number: SCG 3532/SCE 2513
Program Name: CLEO Custom Language Efficiency Outreach Program
Last Updated: 1/7/2010
Updated by: AAW

Total respondents	100
Total population for extrapolation	2,660
Total population reached	6,502

Fuel Share	**SCG/SCE**
Percent Gas Water Heating	0.85
Percent Electric Water Heating	0.05
Percent Gas Heating	0.85
Percent Electric Heating	0.06
Percent central air	0.48

Measure	Measure Number	Unit	n (no assistance)	Square Foot Avg	n adjusted	kWh Unit savings			Therm Unit savings			MWh savings			Therm Savings		
						Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
AddI CFL/lighting	105	house	743		743.00	16.90	33.80	50.70				12.56	25.11	37.67	-	-	-
EE Refrigerator	43	house	22		22.00	50.00	100.00	150.00				1.10	2.20	3.30	-	-	-
Aerator	88b	house	2		2.00	35.27	70.53	105.80	2.89	5.79	8.68	-	-	-	5.79	11.58	17.37
Showerhead	88a	house	4		4.00	47.02	94.05	141.07	3.86	7.72	11.58	-	-	-	11.58	23.15	34.73
EE AC	2	1800 sf	5	2344	6.51	336.79	673.59	1010.38				2.19	4.38	6.57	-	-	-
EE clothes washer	38	unit	1		1.00	12.90	25.80	38.70	4.40	8.80	13.20	0.01	0.03	0.04	4.40	8.80	13.20
EE water heater	78	house	2		2.00	125.88	251.76	377.64	4.93	9.87	14.80	-	-	-	9.87	19.74	29.60
Lighting controls	70	house	1		1.00	465.30	549.90	634.50				0.47	0.55	0.63	-	-	-
Insulation	58	1800 sf	1	1000	0.56	33.01	66.03	99.04	58.89	117.78	176.67	-	-	-	32.98	65.96	98.94
Programmable thermostat	1	1800 sf	1	900	0.50	-17.86	260.50	538.87	-0.16	23.05	46.26	-	-	-	(0.08)	11.52	23.13
TV	NO SAVINGS		1														
Energy Star screen	NO SAVINGS		1														
EE dryer	NO SAVINGS		1														
Gross Total												*16.32*	*32.27*	*48.21*	*64.53*	*140.75*	*216.96*
Level of Influence	0.85																
Net Total												*13.88*	*27.43*	*40.98*	*54.85*	*119.64*	*184.42*

Free Measure	Measure Number	Unit	n	Square Foot Avg	n adjusted	kWh Unit savings			Therm Unit savings			MWh savings			Therm Savings		
						Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
CFL	105	bulb	87		87.00	16.90	33.80	50.70				1.47	2.94	4.41	-	-	-
LED night light	96	bulb	44		44.00	14.24	28.47	42.71				0.63	1.25	1.88	-	-	-
Gross/Net Total for Program Giveaways												*2*	*4*	*6*	-	-	-
Overall Net Total												*16*	*32*	*47*	*55*	*120*	*184*
Per Participant Savings												*0.2*	*0.3*	*0.5*	*0.5*	*1.2*	*1.8*
Extrapolated Savings												*532*	*798*	*1330*	*1330*	*3192*	*4788*
CO2 Emission reductions	0.49 metric tons CO2 per megawatt hour delivered								0.005 metric tons CO2 per therm			261	392	653	7	16	24

Program Number: SCG 3531
Program Name: PACE Energy Efficient Ethnic Outreach Program (Residential)
Last Updated: 1/7/2010
Updated by: AAW

Total respondents	100
Total population for extrapolation	3,413
Total population reached	13,227

Fuel Share	SCG/SCE
Percent Gas Water Heating	0.85
Percent Electric Water Heating	0.05
Percent Gas Heating	0.85
Percent Electric Heating	0.06
Percent central air	0.48

Measure	Measure Number	Unit	n	Square Foot Avg	n adjusted	kWh Unit savings			Therm Unit savings			MWh savings			Therm Savings		
						Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
CFL/lighting	105	house	655		655.00	16.90	33.80	50.70				11.07	22.14	33.21	-	-	-
EE Refrigerator	43	house	20		20.00	50.00	100.00	150.00				1.00	2.00	3.00	-	-	-
EE AC	2	house	4		4.00	336.79	673.59	1010.38				1.35	2.69	4.04	-	-	-
EE clothes washer	38	unit	5		4.25	12.9	25.80	38.7	4.40	8.80	13.20	0.05	0.10	0.15	17.60	35.20	52.80
EE clothes washer	38	unit			0.25	129.00	258.00	387.00				-	-	-	-	-	-
EE water heater	78	house	1		1.00	125.88	251.76	377.64	4.93	9.87	14.80	-	-	-	4.93	9.87	14.80
Lighting controls	70	house	3		3.00	465.30	549.90	634.50				1.40	1.65	1.90	-	-	-
Insulation	58	1800 sf	1	1200	0.67	33.01	66.03	99.04	58.89	117.78	176.67	-	-	-	39.46	78.91	118.37
Furnace	57	1800 sf	3	1525	2.54				17.60	35.20	52.80	-	-	-	59.66	119.32	178.98
Pool pump/motor	97	pump	1		1.00	512.50	1025.00	1537.50				0.51	1.03	1.54	-	-	-
Dishwasher	106		1		1.00	16.50	33.00	49.50	1.00	2.00	3.00	0.02	0.03	0.05	1.00	2.00	3.00
EE dryer	NO SAVINGS		4														
TV	NO SAVINGS		1														
Solar panels	NO SAVINGS		1														
Gross Total												*15.39*	*29.64*	*43.90*	*122.65*	*245.30*	*367.95*
Level of Influence	0.84																
Net Total												*12.93*	*24.90*	*36.87*	*103.02*	*206.05*	*309.07*

Free Measure	Measure Number	Unit	n	Square Foot Avg	n adjusted	kWh Unit savings			Therm Unit savings			MWh savings			Therm Savings		
						Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
Aerator	88b	house	51		51.00	35.27	70.53	105.80	2.89	5.79	8.68	0.11	0.21	0.32	124.45	248.90	373.35
Showerhead	88a	house	39		39.00	47.02	94.05	141.07	3.86	7.72	11.58	0.09	0.19	0.28	127.35	254.69	382.04
Gross/Net Total for Program Giveaways												*0.20*	*0.40*	*0.60*	*251.80*	*503.59*	*755.39*
Overall Net Total												*13.13*	*25.30*	*37.47*	*354.82*	*709.64*	*1064.46*
Per Participant Savings												*0.1*	*0.3*	*0.4*	*3.5*	*7.1*	*10.6*
Extrapolated Savings												*341*	*1024*	*1365*	*11946*	*24232*	*36178*
CO2 Emission reductions	0.49 metric tons CO2 per megawatt hour delivered					0.005 metric tons CO2 per therm						168	503	671	60	121	181
Overall PACE Res and Nonres Net Total												*30.94*	*60.93*	*90.92*	*369.00*	*738.00*	*1107.00*
Overall PACE Res and NonRes Extrapolated Savings												*609*	*1559*	*2168*	*12147*	*24633*	*36847*
CO2 Emission reductions	0.49 metric tons CO2 per megawatt hour delivered					0.005 metric tons CO2 per therm						299	766	1065	61	123	184

Program Number: SCG 3531
Program Name: PACE Energy Efficient Ethnic Outreach Program (Non-Residential)
Last Updated: 1/7/2010
Updated by: AAW

Total respondents	44
Total population for extrapolation	669
Total population reached	4,835

Fuel Share	**SCE commercial**
Percent Gas Water Heating	0.58
Percent Electric Water Heating	0.47
Percent Gas Heating	0.5
Percent Electric Heating	0.38
Percent electric cooling	0.66

Measure	Measure Number	Unit	n	Square Foot Avg	n adjusted	kWh Unit savings			Therm Unit savings			MWh savings			Therm Savings		
						Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
EE lighting	72	1000 sf	23	1550	35.65	282.48	564.96	847.44				10.07	20.14	30.21	-	-	-
Regrigerator	44	unit	6		6.00	598.50	1197.00	1795.50				3.59	7.18	10.77	-	-	-
AC	100a	ton	6	1860	26.00	252.80	505.59	758.39				6.57	13.15	19.72	-	-	-
water heater	79	1000 sf	2	2266.7	4.53				0.59	1.18	1.78	-	-	-	2.66	5.33	7.99
controls/EMS	101	1000 sf	2	1250	2.50	618.50	1237.00	1855.50	11.03	22.07	33.10	1.24	2.47	3.71	11.03	22.07	33.10
insulation	59	1000 sf	1	1500	1.50	-7.45	-14.89	-22.34	3.39	6.78	10.16	(0.01)	(0.01)	(0.02)	3.39	6.78	10.16
windows	NO SAVINGS		1														
EE pump	NO SAVINGS		1														
furnace	NO SAVINGS		2														
daylighting equipment	NO SAVINGS		1														
thermostat	NO SAVINGS		1														
Gross Total												*21.46*	*42.93*	*64.39*	*17.08*	*34.17*	*51.25*
Level of Influence	0.83																
Net Total												*17.81*	*35.63*	*53.44*	*14.18*	*28.36*	*42.54*
Per Participant Savings												*0.4*	*0.8*	*1.2*	*0.3*	*0.6*	*1.0*
Extrapolated Savings												*268*	*535*	*803*	*201*	*401*	*669*
CO2 Emission reductions	0.49 metric tons CO2 per megawatt hour delivered					0.005 metric tons CO2 per therm						132	263	394	1	2	3

Note: for packaged AC, tonnage estimated based on square footage of each facility

Program Number: PGE 2057
Program Name: Green Building Technical Support Services Build it Green (Green Home Tours)
Last Updated: 1/7/2010
Updated by: AAW

Total respondents	143
Total population for extrapolation	982
Total population reached	3,413

Fuel Share	PG&E
Percent Gas Water Heating	0.74
Percent Electric Water Heating	0.09
Percent Gas Heating	0.74
Percent Electric Heating	0.1
Percent central air	0.39

Measure	Measure Number	Unit	n (no assistance)	Square Foot Avg	n adjusted	kWh Unit savings			Therm Unit savings			MWh savings			Therm Savings		
						Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
EE lights	105	house	73		73.00	16.90	33.80	50.70				1.2	2.5	3.7	-	-	-
AC	2	house	6		6.00	336.79	673.59	1010.38				2.0	4.0	6.1	-	-	-
Furnace	57	1800 sf	15	2447	20.39				17.60	35.20	52.80	-	-	-	358.8	717.7	1,076.5
Hot water heater	78	house	12		12.00	125.88	251.76	377.64	4.93	9.87	14.80	0.1	0.3	0.4	44.4	88.8	133.2
Refrigerator	43	house	21		21.00	50.00	100.00	150.00				1.1	2.1	3.2	-	-	-
Commercial cooking/ foodservice	NO SAVINGS		3														
Daylighting equipment	NO SAVINGS		10														
Thermostat	1	1800 sf	28	2712	42.19	-17.86	260.50	538.87	-0.16	23.05	46.26	(0.3)	4.2	8.6	(5.1)	714.5	1,434.0
Insulation	58	1800 sf	34	1708	32.26	33.01	66.03	99.04	58.89	117.78	176.67	0.4	0.9	1.3	1,413.4	2,826.7	4,240.1
Air barrier	99	house	12		12.00	21.52	43.03	64.55	3.29	6.59	9.88	0.1	0.2	0.3	29.7	59.3	89.0
Windows	45	1800sf	29	1838	29.61	21.38	64.15	106.93	4.72	14.16	23.60	0.3	0.8	1.3	103.8	311.5	519.2
Cool roof	NO SAVINGS		2														
EE pump	97	pump	2		2.00	512.50	1025.00	1537.50				1.0	2.1	3.1	-	-	-
Controls/ enerrgy management systems	NO SAVINGS		7														
Steam systems	NO SAVINGS		1														
Renewable energy	NO SAVINGS		9														
Gross Total												*6*	*17*	*28*	*1,945*	*4,718*	*7,492*
Level of Influence	0.73																
Net Total												*4.35*	*12.35*	*20.35*	*1419.87*	*3444.50*	*5469.13*
Per Participant Savings												*0.0*	*0.1*	*0.1*	*9.9*	*24.1*	*38.2*
Extrapolated Savings												*0*	*98*	*98*	*9722*	*23666*	*37512*
CO2 Emission reductions	0.49 metric tons CO2 per megawatt hour delivered							0.005 metric tons CO2 per therm				0	48	48	49	118	188

Program Number:	SCE 2548
Program Name:	Southern California Home Performance Program
Last Updated:	1/7/2010
Updated by:	AAW

Total respondents (company)	47
Total population for extrapolation (company)	112
Total population reached (company)	112

Fuel Share	**SCG/SCE**
Percent Gas Water Heating	0.85
Percent Electric Water Heating	0.05
Percent Gas Heating	0.85
Percent Electric Heating	0.06
Percent central air	0.48

Measure	Measure Number	Unit	n	Square Foot Avg	n adjusted	kWh Unit savings			Therm Unit savings			MWh savings			Therm Savings		
						Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
CFLs	105	bulb	7548		7548.00	16.90	33.80	50.70				128	255	383	-	-	-
Check refrigerant charge for new air conditioners	NO SAVINGS		2,059									-	-	-	-	-	-
Refrigerant charge and air flow diagnostics for existing air conditioners	NO SAVINGS		2,112									-	-	-	-	-	-
Programmable thermostats	1	1800 sf	1677		1677.00	-17.86	260.50	538.87	-0.16	23.05	46.26	(14)	210	434	(233)	32,843	65,918
Duct replacement	102	house	936		936.00	248.50	497.00	745.50	18.80	37.60	56.40	112	223	335	14,965	29,930	44,894
Ceiling insulation	58	1800 sf	880		880.00	33.01	66.03	99.04	58.89	117.78	176.67	14	28	42	44,050	88,099	132,149
Duct sealing	35	house	903		903.00	143.72	287.43	431.15	9.57	19.14	28.71	62	124	187	7,350	14,701	22,051
Attic, crawl space, or other shell sealing	99	house	792		792.00	21.52	43.03	64.55	3.29	6.59	9.88	8	16	25	2,217	4,435	6,652
Energy efficient windows	45	1800sf	624		624.00	21.38	64.15	106.93	4.72	14.16	23.60	6	19	32	2,502	7,505	12,508
Energy efficient water heaters	78	house	396		396.00	125.88	251.76	377.64	4.93	9.87	14.80	3	5	8	1,663	3,326	4,988
Energy Star Refrigerator	43	house	216		216.00	50.00	100.00	150.00				11	22	32	-	-	-
Energy Star clothes washer	38	unit	81		68.85	12.9	25.80	38.7	4.40	8.80	13.20	1	2	3	304	607	911
Energy Star clothes washer	38	unit			4.05	129.00	258.00	387.00				1	1	2	-	-	-
Gross Total												*330*	*905*	*1,480*	*72,818*	*181,445*	*290,073*
Level of Influence	0.91																
Net Total												*300.51*	*823.87*	*1347.22*	*66264.24*	*165115.16*	*263966.08*
Per Participant Savings												*6.4*	*17.5*	*28.7*	*1409.9*	*3513.1*	*5616.3*
Extrapolated Savings												*717*	*1960*	*3214*	*157909*	*393467*	*629026*
CO2 Emission reductions	0.49	metric tons CO2 per megawatt hour delivered				0.005	metric tons CO2 per therm					352	963	1579	790	1967	3145

Program Number:	SDGE 3040
Program Name:	Business Energy Assessment
Last Updated:	2/4/2010
Updated by:	AAW

Total respondents	93
Total population for extrapolation	2,562
Total population reached	2,562

Fuel Share	SDG&E comm
Percent Gas Water Heating	0.58
Percent Electric Water Heating	0.53
Percent Gas Heating	0.47
Percent Electric Heating	0.54
Percent electric cooling	0.71

Measure	Measure Number	Unit	n	Square Foot Avg	n adjusted	kWh Unit savings			Therm Unit savings			MWh savings			Therm Savings		
						Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
Lighting			11										163.0			(401.0)	
HVAC			7										259.0			2,584.0	
Shell			0														
Boilers/Hot Water			1										3.1			-	
Refrigeration			1										0			-	
Dryers			2										-			62	
Compressed Air			1										34			(66)	
Gross Total													*459*			*2,179*	
Level of Influence	0.65																
Net Total													*298.11*			*1416.35*	
Per Participant Savings													*3.2*			*15.2*	
Extrapolated Savings													*8198*			*38942*	
CO2 Emission reductions	0.49 metric tons CO2 per megawatt hour delivered								0.005 metric tons CO2 per therm				4027			195	

Program Number: SDGE 3036
Program Name: Time of Sale Energy Efficiency Check Up (Homeowners)
Last Updated: 1/7/2010
Updated by: AAW

Total respondents	60
Total population for extrapolation	3,238
Total population reached	3,238

Fuel Share	SDG&E
Percent Gas Water Heating	0.76
Percent Electric Water Heating	0.05
Percent Gas Heating	0.74
Percent Electric Heating	0.13
Percent central air	0.35

Measure	Measure Number	Unit	n	Square Foot Avg	n adjusted	kWh Unit savings Low	kWh Unit savings Medium	kWh Unit savings High	Therm Unit savings Low	Therm Unit savings Medium	Therm Unit savings High	MWh savings Low	MWh savings Medium	MWh savings High	Therm Savings Low	Therm Savings Medium	Therm Savings High
Replace inc. with CFLs (not free)	67	hh	35		35.00	84.50	169.00	253.50				2.96	5.92	8.87	-	-	-
Low-flow showerhead (not free)	88a	unit	19		19.00	47.0	94.0	141.1	3.9	7.7	11.6	0.05	0.09	0.14	54	108	162
Insulate water heater pipes	103	hh	13		13.00	81.00	162.00	243.00	4.15	8.30	12.45	0.08	0.16	0.24	42	83	125
Programmable thermostat	1	1800 sf	18	2206	22.06	-17.9	260.5	538.9	-0.2	23.0	46.3	(0.14)	2.08	4.31	(3)	369	740
Improve or seal ducts	35	hh	9		9.00	143.7	287.4	431.1	9.6	19.1	28.7	0.43	0.86	1.29	67	134	201
Advanced HVAC Diagnosis and Tune-Up	ASSUMED TO BE COUNTED IN OTHER PROGRAMS		4		4.00												
Kitchen fluorescent light fixtures	NO SAVINGS		17		17.00												
Reduce air infiltration drafts	99	hh	15		15.00	21.5	43.0	64.5	3.3	6.6	9.9	0.11	0.22	0.32	36	72	109
CFL fixtures (no doublecounting wit	67	hh	1		1.00	84.50	169.00	253.50				0.08	0.17	0.25	-	-	-
Upgrade insulation	58 (ceiling)	1800 sf	2	1030	1.14	33.0	66.0	99.0	58.9	117.8	176.7	-	-	-	59	118	177
Upgrade air conditioner	2	1800 sf	4	1974	4.39	336.8	673.6	1010.4				1.48	2.95	4.43	-	-	-
Upgrade electric furnace	NO SAVINGS		1		1.00							-	-	-	-	-	-
Upgrade dishwasher	106	unit	8		6.08	16.50	33.00	49.50	1.00	2.00	3.00	0.10	0.20	0.30	6	12	18
	106	unit			0.40	37.00	74.00	111.00				-	-	-	-	-	-
Upgrade refrigerator	43	unit	15		15.00	50.0	100.0	150.0				0.75	1.50	2.25	-	-	-
Upgrade water heater	78	hh	4		4.00	125.9	251.8	377.6	4.9	9.9	14.8	-	-	-	15	30	44
Upgrade gas furnace	57	1800 sf	0		0.00				17.6	35.2	52.8	-	-	-	-	-	-
Upgrade windows	45	1800 sf	8	1169	5.20	21.4	64.2	106.9	4.7	14.2	23.6	0.04	0.13	0.21	19	57	94
Upgrade clothes washer	38	unit	9		6.84	12.9	25.8	38.7	4.4	8.8	13.2	0.09	0.18	0.27	31	62	92
	38	unit			0.45	129.0	258.0	387.0				-	-	-	-	-	-
Set AC to 78 in summer	7	hh	26		26.00	561.00	778.00	995.00				14.59	20.23	25.87	-	-	-
Set heat to 68 in winter	7	hh	26		26.00				35.34	62.58	89.81	-	-	-	671	1,189	1,706
Run full dryer	NO SAVINGS		36		36.00												
Run full dishwasher	NO SAVINGS		35		35.00												
Turn off lights	98	hh	40		40.00	245.5	491.0	736.5				9.82	19.64	29.46	-	-	-
Turn off electronics/appliances	16	hh	38		38.00	13.2	21.3	29.4				0.50	0.81	1.12	-	-	-
Unplug devices/power strips	All included in turn off		18		18.00												
Take shorter showers	86	hh	1		1.00	174.12	348.24	522.37	8.91	17.83	26.74	-	-	-	9	18	27
Occupancy sensors	70	hh	1		1.00	465.3	549.9	634.5				0.47	0.55	0.63	-	-	-
Use celing fans instead of AC	34	hh	2		2.00	742.90	1616.95	2491.00				1.49	3.23	4.98	-	-	-
Unplug/remove second fridge	15	unit	0		0.00	973.00	1946.00	2919.00				-	-	-	-	-	-
Repaired leaking fire place dampe	92	hh	1		1.00	13.47	26.94	40.42	1.16	2.31	3.47	-	-	-	1	2	3
Gross Total												*31*	*55*	*79*	*997*	*2,233*	*3,469*
Level of Influence	0.71																
Net Total												*21.96*	*39.15*	*56.34*	*707.86*	*1585.35*	*2462.83*

Free Measure	Measure Number	Unit	n	Square Foot Avg	n adjusted	kWh Unit savings Low	kWh Unit savings Medium	kWh Unit savings High	Therm Unit savings Low	Therm Unit savings Medium	Therm Unit savings High	MWh savings Low	MWh savings Medium	MWh savings High	Therm Savings Low	Therm Savings Medium	Therm Savings High
Indoor CFL (gift)	individual bulb	unit	577		577.00	16.9	33.8	50.7				10	20	29	-	-	-
Outdoor CFL (gift)	64 adj	unit	42		42.00	66.5	133	199.5				3	6	8	-	-	-
Faucet Aerator (gift)	88b	hh	12		12.00	35.3	70.5	105.8	2.9	5.8	8.7	0.04	0.07	0.11	26	52	78
Low-Flow Shower Head (gift)	88a	unit	18		18.00	47.0	94.0	141.1	3.9	7.7	11.6	0.05	0.09	0.14	54	108	162
LED Nite Lite (gift)	96	unit	36		36.00	14.2	28.5	42.7				1	1	2	-	-	-
Gross/Net Total for Program Giveaways												*13*	*26*	*39*	*80*	*160*	*240*
Overall NetTotal												*35*	*65*	*96*	*788*	*1,745*	*2,703*
Per Participant Savings												*0.6*	*1.1*	*1.6*	*13.1*	*29.1*	*45.1*
Extrapolated Savings												*1943*	*3562*	*5181*	*42418*	*94226*	*146034*
CO2 Emission reductions	0.49 metric tons CO2 per megawatt hour delivered								0.005 metric tons CO2 per therm			955	1750	2545	212	471	730
Overall TOS Realtor and Homeowner Net Total												*52.28*	*99.89*	*147.49*	*845.42*	*1860.45*	*2875.48*
Overall TOS Realtor and Homeowner Extrapolated Savings												*1964*	*3614*	*5253*	*42500*	*94391*	*146292*
CO2 Emission reductions	0.49 metric tons CO2 per megawatt hour delivered								0.005 metric tons CO2 per therm			965	1775	2581	213	472	731

Program Number: SDGE 3036
Program Name: Time of Sale Energy Efficiency Check Up (Realtors)
Last Updated: 1/7/2010
Updated by: AAW

Total respondents	70
Total population for extrapolation	103
Total population reached	406

Fuel Share	SDG&E
Percent Gas Water Heating	0.76
Percent Electric Water Heating	0.05
Percent Gas Heating	0.74
Percent Electric Heating	0.13
Percent central air	0.35

Measure	Measure Number	Unit	n	Square Foot Avg	n adjusted	kWh Unit savings			Therm Unit savings			MWh savings			Therm Savings		
						Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
Insulate attic	58	1800sf	1		1.00	33.0	66.0	99.0	58.9	117.8	176.7	-	-	-	59	118	177
Use fan instead of AC	34	hh	1		1.00	742.90	1616.95	2491.00				0.74	1.62	2.49	-	-	-
Turn off lights	98	hh	1		1.00	245.5	491.0	736.5				0.25	0.49	0.74	-	-	-
Unplug electronics	16	hh	1		1.00	13.2	21.3	29.4				0.01	0.02	0.03	-	-	-
Cover windows in winter	NO SAVINGS		1		1.00												
Wrap hot water heater	89	hh	1		1.00	202.39	404.79	607.18	10.36	20.72	31.08	-	-	-	10	21	31
Change CFLs in home (no double counting with gifts)	67	hh	8		8.00	84.50	169.00	253.50				0.68	1.35	2.03	-	-	-
Gross Total												*2*	*3*	*5*	*69*	*139*	*208*
Level of Influence	0.83																
Net Total												*1.39*	*2.89*	*4.39*	*57.48*	*114.96*	*172.44*

Free Measure	Measure Number	Unit	n	Square Foot Avg	n adjusted	kWh Unit savings			Therm Unit savings			MWh savings			Therm Savings		
						Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
Indoor CFL (gift)	ndividual bulb	unit	934		934.00	16.9	33.8	50.7				16	32	47	-	-	-
Gross/Net Total for Program Giveaways												*16*	*32*	*47*	-	-	-
Overall NetTotal												*17*	*34*	*52*	*57*	*115*	*172*
Per Participant Savings												*0.2*	*0.5*	*0.7*	*0.8*	*1.6*	*2.5*
Extrapolated Savings												*21*	*52*	*72*	*82*	*165*	*258*
CO2 Emission reductions	0.49 metric tons CO2 per megawatt hour delivered					0.005 metric tons CO2 per therm						10	26	35	0.4	0.8	1.3

Program Number:	PGE 2044
Program Name:	Builder Energy Code Training (Builders)
Last Updated:	1/7/2010
Updated by:	AAW

Total respondents	44
Total population for extrapolation	750
Total population reached	750

Fuel Share	**PG&E**
Percent Gas Water Heating	0.74
Percent Electric Water Heating	0.09
Percent Gas Heating	0.74
Percent Electric Heating	0.1
Percent central air	0.39

Measure	Measure Number	Unit	n	Average Houses	n adjusted	kWh Unit savings			Therm Unit savings			MWh savings			Therm Savings		
						Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
HVAC	109		16	245	3920.00	33.5	67	100.5	6	12	18	51.2	102.4	153.7	17,406.0	34,812.0	52,218.0
Hot Water	108		15	253	3795.00	125.5	251	376.5	12	24	36	42.9	85.8	128.8	33,696.0	67,392.0	101,088.0
Lighting	107		18	387	6966.00	66.5	133	199.5				463.2	926.5	1,389.7	-	-	-
Gross Total												*557*	*1,115*	*1,672*	*51,102*	*102,204*	*153,306*
Level of Influence	0.72																
Net Total												*401.31*	*802.63*	*1203.94*	*36793.44*	*73586.88*	*110380.32*
Per participant savings for the 25 respondents who answered this question												*16.05*	*32.11*	*48.16*	*1471.74*	*2943.48*	*4415.21*
Estimated savings for the 31 respondents (an additional 6 who we know took action and should have received this question)												*497.63*	*995.26*	*1492.89*	*45623.87*	*91247.73*	*136871.60*
Per Participant Savings												*11.3*	*22.6*	*33.9*	*1036.9*	*2073.8*	*3110.7*
Extrapolated Savings												*8475*	*16950*	*25425*	*777675*	*1555350*	*2333025*
CO2 Emission reductions	0.49 metric tons CO2 per megawatt hour delivered					0.005 metric tons CO2 per therm						4163	8327	12490	3888	7777	11665

Note: Only 25 respondents answered the question that determined energy savings while 31 should have.

APPENDIX E: COMMENTS RECEIVED ON REPORT

Comments Concerning 2006-2008 Third Party Program Indirect Impact Evaluation Study

From Southern California Edison Company

Thank you for making the indirect impact evaluation of the third party programs available for review. We are pleased to received three volumes of this evaluation which is packed full with program design, implementation and indirect impact findings.

In this evaluation, SCE's program 2548 (Southern California Home Performance Program) and program 2513 (Customer Language Efficiency Outreach aka CLEO) are selected for standard rigor level of assessment.

Four other programs are selected for verification only: SCE 2540 (1-to-5 SEED), 2542 (Affordable Housing Energy Efficiency Alliance), 2545 (E-mail Based Energy Efficiency), and 2547 (Aggregation of Housing Agencies for Energy Retrofit and Management).

The comments below will focus on program 2548 (Southern California Home Performance Program) and 2513 (Community Language Efficiency Outreach) only:

1. The SCE Community Language Efficiency Outreach Program (2513) was implemented in collaboration with Southern California Gas Company (program 3532). Throughout the report in both volume I and volume II, we found inconsistent program labeling causing confusion. In volume II of the report, the SCE program 2513 was consistently labeled as 3513. In volume I, the heading varies between SCG 3532-only to an occasional combined labeling of 3532 and 2513. This is all very confusing, please fix this.

2. On table 42, page 76, we believe Southern California Home Performance Program (2548) is also supports Workforce Education and Training and it supports commercial sector by providing training to contractors/installers.

3. Under section 12.1.2, page 81, recommendations, we believe these programs' performance metric should be similar to what has been proposed for the Education Training and Outreach Programs which is awareness, knowledge and attitude, leading to behavior change and indirect impact. We agree with your comments concerning the need to align these programs with the long-term strategic plan and to provide early clarification of the third party programs' role to the program portfolio.

4. Appendix C, page 84, we generally find the Cognitive Change Index (CCI) to be reasonable. We do question if concept 1 and concept 2 are truly independent from each other. Perhaps the other alternative is to combine the value concept 1 and 2, then compare to concept 3. The CCI is also vulnerable to self-selection bias which cannot be avoided.

5. On page 84, for concept 2, you talked about "mean" of the four survey questions, do

you really mean to say “average” here? Your formula just below indicated “average”.

6. Contrary to the indirect energy impact analysis for the Energy Centers, the variability of the savings from participant to participant is not as drastic making an average energy savings estimate possible at a participant basis. This is good news.

7. Appendix D, Energy Savings Analysis, we found this information to be very helpful. This same information should be provided for the Energy Centers as part of Education Training and Outreach evaluation.

Finally, we agree, the third party indirect impact evaluation in combination with findings from our process evaluation have provided significant inputs to shape our EE program design, implementation and marketing initiatives. Thank you.

Response to Comments

Our responses are provided by number.

1. The labeling in Volume I and II was updated to reduce the confusion.

2. This program was added as one that could support Workforce Education and Training and Commercial Sector goals.

3. The comment is noted. The appropriate metrics may include your suggestions, but are best determined based on the specific programs involved during a specific program cycle. The continuum indicated is not the best way to assess a program such as Portfolio of the Future.

4. The comments are noted. Within the comments on the Education & Training programs, the suggestion was made to have a workshop on the Cognitive Change Index (CCI). The CPUC may consider a workshop on this issue.

5. The terms “mean” and “average” are the same mathematically.

6. No response is needed to this comment.

7. The analysis of the energy savings for the Energy Centers was more complex than this analysis. The analytical process and results from that effort does not lend itself to hardcopy presentation.

Comments from Grey Staples

I thought the report contained a lot of good information. A few observations:

1. the report uses the term "cost effective" a few times but it's unclear what cost effective means in the context of a non-resource program

2. further to this point, the report cites p. 60 of D.05-04-051 which explains that the "performance basis" for audit/targeted information programs should "measure net benefits" - again, it's unclear what 'net benefits' in this context means

3. the recommendations for program design are good but it would be helpful to have more robust recommendations regarding what the programs themselves could do to improve their

outcomes (the three provided recommendations relate to a) the role these programs should play in efforts to accomplish the Strategic Plan, b) the expectations that should be set for these programs, and c) the benefit of targeting specific market actors-this last recommendation is a good example of what programs could do to improve their outcomes), and

4. although this might be outside the evaluation's scope, it would be good if the evaluation provided specific recommendations to the PUC to help improve non-resource program outcomes.

So, in summary, lots of good information here, particularly the attempts to estimate energy savings associated with these programs and the indirect benefits the programs provide. But, I guess I'm still wondering whether the success criteria mechanisms to determine the value these programs offer (and whether a program should be continued, for example) are sufficient. These are probably issues for the PUC more than this evaluation, but it would be helpful if the evaluation elevated them.

Thank you,

Grey Staples

Response to Comments

Responses are provided by number.

1. It is correct in that cost effectiveness is typically shown by a benefit cost analysis whereby the monetary savings from kWh reduction and program costs are applied to a given program. However, the value that these programs provide versus the cost gives a sense of whether the dollars have been prudently spent.

2. The determination is that the net benefits are the behavior changes as well as the indirect energy savings.

3. An impact evaluation does not enable the best recommendations regarding program implementation as the focus of the assessments is not on the program processes. These programs most likely had process assessments that can provide the more robust recommendations desired.

4. This is similar to the response in #3. As indicated, that this was outside of the scope of the evaluation.

The processes in place for determination of success criteria are under the purview of the CPUC.