



California Public Utilities Commission

**2010 – 2011 Energy Efficiency  
Annual Progress Evaluation Report**

September 2012





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# Executive Summary



## Objectives and Scope of This Report

The California Public Utilities Commission's (CPUC's) Energy Efficiency Annual Progress and Evaluation report summarizes the implementation of California's investor-owned utilities' (IOUs)<sup>1</sup> 2010 – 2012 energy efficiency portfolio,<sup>2</sup> based on the best available

information from ongoing evaluation studies.<sup>3</sup> The IOUs are responsible for implementing energy efficiency programs and the CPUC's Energy Division (ED) is responsible for overseeing and evaluating these activities to inform future policy direction, improve program design, and refine savings estimates.<sup>4</sup>

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1 The CPUC regulates California's four investor owned utilities, including Pacific Gas & Electric (PG&E), Southern California Edison (SCE), San Diego Gas & Electric (SDG&E) and Southern California Gas (SoCal Gas).

2 The energy efficiency portfolio is the total combination of energy efficiency programs (including technologies and activities), anticipated savings and planned budget for a given 2 or 3 year cycle. See "D. 09-09-047" <http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/>

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3 ED is responsible for conducting a large amount of primary research and evaluation for energy efficiency programs supported by the CPUC and implemented by California's investor-owned utilities. Evaluation and research efforts include savings measurement and verification, program evaluation, market assessment, policy planning and support, and financial and management audit. See "2010 – 2012 EM&V Work Plan," available at <http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/>

4 D.09-09-047 authorizing the 2010 – 2012 energy efficiency portfolio authorized funding for evaluation research overseen by Energy Division and executed by both Energy Division and the Investor Owned Utilities, as further outlined in D.10-04-029.

## Executive Summary | 2010 – 2011 Energy Efficiency Evaluation Report

The information contained in this report fulfills the legislative mandate for a triennial report on energy efficiency activities in the state per Section 384.2 of the California Public Utilities Code.<sup>5</sup> The Commission approves a portfolio of energy efficiency programs on a two or three year cycle, the most recent program cycle started in 2010 and is being implemented through 2012, and is the focus of this report. The next program cycle is expected to begin in 2013 and run through 2014. Energy Division intends to report annually going forward to share progress on the continuous implementation of energy efficiency programs as well as the latest highlights from evaluation research.<sup>6</sup>

This report is relevant to understanding progress made by the IOUs in fulfilling Commission policy and meeting goals within current and future program cycles. It also tracks the IOUs' energy efficiency activities towards meeting multiple statewide energy and climate policy objectives including the Energy Action Plan, AB 32 and the California Energy Efficiency Strategic Plan.

Because the portfolio cycle is still in progress and field research is underway, this report is based on 2010 – 2012 portfolio savings reported by the IOUs through the end of December 2011 and research results available to date, which consist of a wide range of studies conducted by professional researchers managed by

IOU and CPUC staff.<sup>7</sup> The savings values included in this report have not yet been verified through field research by the CPUC, although the impact studies that provide this verification are underway, the results of which will be included in next year's annual report.<sup>8</sup> Consequently, the CPUC considers the utility-reported savings numbers provided in this document to be estimated savings.<sup>9</sup>

Comparisons between reported savings and the projected savings targets are made throughout the report. It is important to note that the Commission sets goals for the IOUs at the portfolio level not at the program level, and as such the IOUs have flexibility in how they organize the portfolio to achieve the goals. The projected savings in this report are based on IOU programs and savings estimates filed with the Commission in 2009, based on their knowledge at the time. If significant shifts in budgets or savings were made during the program cycle they are cited in the text where relevant.

Finally, research findings are best understood in the context of the full research. Given the

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5 Section 384.2 of the California Public Utilities Code calls for a report to be submitted to the legislature beginning July 2009 and triennially thereafter.

6 Reports for prior program cycles 2006-2008 and 2009 are available on the CPUC website: <http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/>

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7 Studies that have been completed and are cited in this report can be found at [CALMAC.org](http://CALMAC.org) or [www.energydata.web](http://www.energydata.web); and are also listed at the end of each chapter and in appendix E.

8 Savings are based on the detailed quarterly data submissions provided by the IOUs. Energy Division has worked with the IOUs to ensure that the savings estimates are consistent with their filed savings, but have not reviewed them for accuracy in applying Commission approved values.

9 Energy Division will assess the achievement of the portfolio based on field evaluation which will provide updated estimates for the number of technologies installed, their performance based on field conditions and actual baselines, as well as estimates of program influence. These updated estimates are referred to as "ex-post" results and will be reported next year.

summary nature of this report, readers are encouraged to return to the original source documents for a more comprehensive treatment of the material summarized herein.

## Overview

To meet its aggressive electricity and natural gas energy efficiency goals, the CPUC authorized \$3.1 billion in ratepayer-funded energy efficiency programs for the 2010 – 2012 program cycle. The 5,900 GWh in electricity savings reported by the IOUs as of December 2011 is enough to power over 600,000 households for a year<sup>10</sup> and offset potentially 1,069 megawatts (MW) of electric capacity, the equivalent of 3 major power plants. The programs are estimated to have cut CO<sub>2</sub> emissions by 3.8 million tons, the equivalent of removing over 700,000 cars from California's roads.<sup>11</sup>

The 2010 – 2012 energy efficiency portfolio supports the policy objectives of the Energy Action Plan, which calls on the state to capture all cost-effective energy efficiency and demand response opportunities prior to planning to build additional power plants. It also directly contributes to achieving "complementary policy" carbon-reduction goals described in The

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<sup>10</sup> CEC report on average CA household 400-800 kWh/mo; take total accomplishments kWh (5,900 GWh) / (800kwh\*12) = over 600,000 households powered for a year.

<sup>11</sup> In estimating CO<sub>2</sub> emissions reductions associated with gas and electric savings, Energy Division used the emissions factors that are embedded in the E3 Calculators, which are specific to each technology installed. In estimating the number of cars removed from California roads, ED used the factors presented in D.05-09-045 which approved the IOU programs for 2006-2008 and included an estimate of cars removed (1 car for every 5.26 tons of CO<sub>2</sub>)

California Air Resources Board's AB32 Scoping Plan. In addition, the portfolio supports the California Energy Efficiency Strategic Plan, which is a framework to prime the market for future energy savings opportunities through market transformation activities.

Several other policy objectives are either directly or indirectly addressed by the IOUs' energy efficiency activities and are noted in this report. These include legislative mandates for inventorying building benchmarking (AB1103), and in the future, AB758, a comprehensive program to retrofit all residential and commercial buildings in the state.<sup>12</sup>

## Impacts of the 2010 – 2012 Energy Efficiency Portfolio

Based on the IOUs' reported (but, as yet unverified) savings to date for all IOU programs, except Codes and Standards advocacy, the 2010 – 2012 portfolio is on track to meet the IOUs' projected savings and has met or exceeded the Commission's 2010 and 2011 adopted goals. An additional 2,178 gigawatt hours, 364 megawatts and 30 million therms are expected from the IOUs' Codes and Standards efforts, which have not been verified.<sup>13</sup> The savings claimed by the IOUs to date from program activity through December 2011 have been achieved by spending approximately half of total budgets in the same time period.

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<sup>12</sup> Although a program relevant to AB758 was not in place as of July 2012, future reports pursuant to CPUC Code Section 384.2 will highlight progress.

<sup>13</sup> Savings from Codes and Standards are credited to the utilities after evaluation is conducted and is counted toward the goals on a net basis. See D.09-09-047 Codes and Standards section for details on accounting.

**Table I.** Estimated Savings<sup>14,15</sup>

	<b>Peak Demand</b>	<b>Electricity</b>	<b>Natural Gas</b>	<b>CO<sub>2</sub></b>	<b>C/E</b>
	<b>MW</b>	<b>GWh</b>	<b>Mtherms</b>	<b>Tons</b>	<b>TRC</b>
<b>Statewide Reported through 2011</b>	1,069	5,736	84	3,729,445	2.02
<b>Projected through 2012</b>	1,635	8,121	171	N/A	n/a
<b>Codes and Standards* through 2012</b>	364	2,178	30	n/a	n/a
<b>Commission Adopted Goal 2010 – 2011</b>	1,014	4,601	98	n/a	n/a

Source: ReportWorkbook\_20120627\_jst; IOU quarterly data filed June 1, 2012

\* Codes and Standards are net savings expected.

<sup>14</sup> The projected savings, included in this report at sector and program levels, were estimated by the IOUs with the best available information at the time of their application and represent a full three years of expected activity. The utilities are accountable for achieving the total portfolio goals defined by the Commission (in D.09-09-47 for the 2010 – 2012 program period) and ensuring the portfolio is cost effective, but have the flexibility for any given program or even sector (as presented in this report) may not meet the projected savings target or be cost effective for a variety of reasons. Reported savings represent what has been installed to date, but does not represent evaluated results.

<sup>15</sup> The Total Resource Cost (TRC) test measures the net resource benefits to all ratepayers by combining the net benefits of the program to participants and non-participants. The benefits are the avoided costs of the supply-side resources either avoided or deferred. The TRC costs encompass the cost of the measures or equipment installed (by the customer) and the costs incurred by the program administrator for both resource and non-resource program activities.

**Figure I.** Estimated Savings and Performance Towards Goals



\* Gross goals; gross estimated savings

While the reported savings exceed the Commission defined goals, the savings claims are subject to a variety of field validation and verification to understand what was actually achieved “on the grid.” The field research is important to validate the actual impacts of the investments and inform future updates to savings estimates and improvements in program design. Evaluation also includes an assessment of the program influence in achieving the savings over what would have happened without the program intervention. This information is used to understand the relative cost effectiveness of the programs and transitions in the market. These updates will be included in the 2013 annual report. The CPUC oversees the implementation of a joint evaluation plan with the IOUs, which allocates \$93 million in project funds (net of management costs) to roughly 80 studies that address

key research needs.<sup>16</sup> Studies are focused on four core research areas:

- **Savings measurement** and verification of energy efficiency measures and programs which inform core metrics of savings against goals, and cost effectiveness, as well as developing reliable estimates of load impacts;
- **Program evaluation** of specific qualitative and quantitative factors of performance, to inform improvements in program design and support forward-looking corrections to utility programs and portfolios;

<sup>16</sup> A total of \$125 million was allocated for evaluation activities in the CPUC’s 2010 – 2012 energy efficiency portfolio decision (D.09-09-047); this amount represents four percent of the program portfolio budget further detail and processes governing the evaluation were adopted by the Commission in D.10-04-029.

- **Market assessments** that gauge current market situations that inform savings baselines, identify and track appropriate baseline metrics of market change, measure progress toward achieving long term Strategic plan objectives, and inform estimates of remaining potential for energy efficiency; and
- **Policy and planning support** that include overarching studies to inform Commission policy.

## Sources of Energy Savings

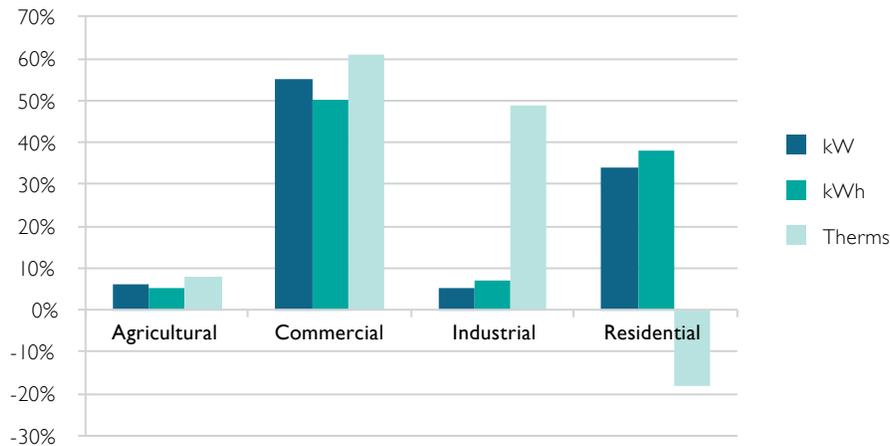
The portfolio energy savings have been achieved via interventions in multiple market sectors and customer segments. Programs promote improvements in efficiency by addressing barriers to the adoption of high efficiency technologies and other efficiency

measures across the state, starting with research into new technologies, driving adoption in the market, and advocating and facilitating the adoption of codes and standards.

### By Sector

The residential, commercial, industrial and agricultural sectors are the four primary categories of customers in the state. Eighty-nine percent of savings achieved through 2011 have occurred in the commercial (55 percent) and residential (34 percent) sectors, with the agricultural and industrial sectors combined making up the remaining twelve percent of electric savings. In designing the portfolio, the utilities consider the savings potential and design programs to capture savings for these given customer segments. In addition to these customer-specific interventions,

**Figure 2.** Distribution of Claimed Savings by Customer Sector <sup>17</sup>



Source: ReportWorkbook\_20120627\_JST; IOU quarterly data filed June 1, 2012

\* Codes and Standards not included

<sup>17</sup> Although there were natural gas savings in the residential sector, these were negated by interactive effects largely due to the concentration of savings in efficient indoor lighting technologies.

programs oriented to codes and standards promotion represent approximately 38 percent of total portfolio savings when all segments are combined.<sup>18</sup>

**By Technology**

The technologies that drive savings are different in any given customer segment or sector. However, some technologies, such as high efficiency lighting and heating ventilation and air conditioning (HVAC), are prevalent in programs across the portfolio. Through 2011, the majority of electric savings achieved have been through lighting (59 percent), followed by process improvements<sup>19</sup> (13 percent) and HVAC (10 percent). Natural gas savings are primarily achieved in the industrial sector, where 47 percent of the savings are generated through process improvements. Appendix A provides a detailed list of the specific technologies that make up the majority of reported savings in each sector.

**Table 2.** Claimed Savings by Technology

Technology Group	kW	kWh	therms
Indoor Lighting	58.34%	58.76%	-49.64%
Process	10.44%	12.20%	92.02%
HVAC	13.19%	9.48%	18.12%
Refrigeration	3.20%	5.44%	0.07%
Plug Loads	2.28%	4.19%	-3.72%
Appliance	3.91%	3.75%	-3.02%
Outdoor Lighting	0.24%	1.90%	-0.01%
Whole building	3.44%	1.82%	8.22%
Building Envelope	2.02%	0.53%	5.27%
Survey	1.34%	0.51%	1.49%
Other	0.18%	0.45%	2.29%
Laundry	0.92%	0.41%	5.47%
Water Heating	0.36%	0.37%	20.43%
Food Service	0.13%	0.18%	1.40%
Greenhouse	0.00%	0.00%	1.61%

<sup>18</sup> Codes and Standards projections, as currently estimated (2,178 GWh, 364 MW, and 30 Mtherms) are for the three year program cycle, when compared to reported savings they make up 38 percent of GWh, 34 percent of MW and 28 percent of therm claims to date.

<sup>19</sup> Process improvements generally describes improved management of existing systems, modification or replacement of equipment, minimization of waste or resource usage, enhanced quality management, adoption of preventive maintenance and improvement of productivity and management practices.

Source: ReportWorkbook\_20120627\_JST; June 1, 2012 quarterly data

**By Geography**

Table 2 provides the portfolio savings by county for the five counties with the highest reported savings in the four IOUs' service territories. Information about program participants and how and where the savings occur can further illuminate where the impacts and benefits occur. Appendix E provides all reported portfolio savings by zip code and county. (It is important to note, though, that geographic focus of the

programs have shifted over time, and this data represents only the current portfolio's savings distribution.) Energy Division provides the geographic information on savings to supply-side planners (California Energy Commission as well as internal Resource Adequacy and Long Term Procurement Planning within Energy Division) to understand more clearly where the savings occur and inform future energy grid planning.

**Table 3.** Counties with the Highest Savings in the State

<b>Top Five County Savings</b>	<b>Electricity Savings (kWh)</b>	<b>Top Five County Savings</b>	<b>Natural Gas Savings (MTherms)</b>
Los Angeles	1,250,110,416	Contra Costa	24,789,723
Orange	516,366,807	Los Angeles	15,744,171
San Bernadino	502,563,527	Solano	13,626,116
San Diego	463,306,373	Santa Clara	4,632,243
Riverside	299,839,158	San Bernadino	4,352,506

Source: ReportWorkbook\_20120627\_JST; June 1, 2012 quarterly data

## 2010 – 2012 Portfolio Highlights

### Defining Success

A portfolio can be considered successful if it is cost-effective<sup>20</sup> and meets all of the CPUC's savings goals. However, the Strategic Plan provides additional considerations that require a more nuanced assessment, such as achieving long-term market transformation goals and similar strategic objectives. The 2010 – 2012 portfolio reflects a balance of these shorter and longer term priorities, leveraging cost-effective drivers of energy efficiency (e.g., industrial programs and lighting) to support programs that, while not cost-effective today, have the potential to drive substantial savings in the future (e.g., zero net energy pilot programs).

Through 2011, the portfolio has an estimated cost effectiveness of 2.02 using the total resource cost test, meaning that for every dollar invested in energy efficiency the benefits were double. This value is based on IOU reported total savings and costs<sup>21</sup>, and will be updated as savings numbers, implementation costs, and program attribution levels are validated through field research. Lighting programs delivered through an upstream intervention strategy continue to be highly cost effective, as are various programs that are targeted to very specific markets (like schools) and/

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20 The policy rules require that the energy efficiency portfolio as a whole has more benefits than costs, based on both the Total Resource Cost (TRC) and Program Administrator Cost (PAC) tests. The Standard Practice Manual details the Commissions' methodologies. Information at <http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/Cost-effectiveness.htm>

21 As noted earlier the Total Resource Cost test is the primary driver for cost effectiveness. The TRC included in this report are based on the gross benefits and gross costs (i.e. not including program attribution adjustments)

or offer full service assessment and installation (a.k.a. direct install) for the customer. Appendix C provides the cost effectiveness results for all programs.

The utilities have also made progress in all market sectors to develop complementary programs that address long-term market transformation. While the impact of these activities has not been measured and will not likely be measurable within this program cycle, these programs serve the important role of priming the market for future savings by building the state's capacity to deliver energy efficiency goods and services.

### Program Highlights

This report highlights eleven areas of programmatic activity in the 2010 – 2012 energy efficiency portfolio, which are designed to overcome barriers to investing in energy efficiency in a wide range of customer segments and promote a range of specialized technologies and services. The following list of highlights provides an overview of the portfolio at this interim point.

- Residential energy savings continue to be driven by long-running programs that include lighting, followed by appliances;
- Commercial programs have been modified to standardize savings and expand participation in the audit, retro-commissioning, calculated incentives and direct install programs.
- Programs in the industrial and agricultural sectors continue to deliver significant energy savings to California and are adapting to review processes savings prior to program implementation.
- The upstream HVAC equipment incentive program, where distributors are incentivized to promote energy efficient products, has

consistently been achieving savings goals and is cost effective.

- The 2010 – 2012 statewide Codes and Standards Program budget is less than 1 percent of the total portfolio (\$30 million), but is projected to account for about 22 percent of the total electricity savings and 25 percent of the natural gas savings;
- More than 40 cities, counties, and regional governments are working with the IOUs as partners to deliver energy efficiency programs and services in their areas;
- In lighting, there are clear trends of falling shipments of basic lamps in IOU programs, and increasing trends for advanced lamps since 2008<sup>22</sup>; and
- On Bill Financing's \$41.5 million loan pool quickly became oversubscribed in SCE service territory – an indicator not only of popularity, but of success in driving adoption of energy efficient products and practices.

### Challenges and Barriers to Success to Across the Portfolio

Implementing a large portfolio of energy efficiency programs with diverse objectives is bound to present challenges and barriers. Completed evaluations have helped to reveal some of these challenges and barriers. As reflected in the examples provided below, in most cases the challenges and barriers are unique to a specific sector or program and more detailed

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22 "Basic" refers to the standard, screw-in compact fluorescent lamps (CFLs) of less than 30 watts. "Advanced" refers to all other lighting products, such as: including dimmable, three-way, and specialty CFLs, so-called "super" CFLs, light emitting diodes (LEDs), halogen, and other lighting products.

descriptions of the issues and recommendations to address them are provided in the reports cited in this document:

- Despite policy objectives encouraging more comprehensive, long-term energy savings projects (e.g. approaches that offer customers suites of efficiency measures rather than single technology rebates) many projects in the non-residential sector continue to focus on short-term payback and "shallow" savings<sup>23</sup>;
- Funding and regulatory silos (e.g., energy efficiency, demand response and distributed generation) are among the challenges that inhibit efforts to effectively integrate customer demand side management activities<sup>24</sup>;
- Training issues hinder effective program delivery in the residential sector — retail staff needs more education about promoting energy-efficient products for the BCE and HEER programs, while retrofit contractors need more training in EUC programs;<sup>25</sup> ;
- IOU program management tools, documentation and data management present a barrier to greater integration of programs, within the energy efficiency portfolio (i.e. Emerging Technologies) and across demand side strategies (i.e. IDSM) in several programs, causing difficulty in tracking and evaluating impacts of these programs;

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23 Draft Third Party Industrial and Agricultural Program Assessment, not yet posted to [www.energydataweb.com](http://www.energydataweb.com)

24 Draft Third Party Industrial and Agricultural Program Assessment, not yet posted to [www.energydataweb.com](http://www.energydataweb.com)

25 See SCE and PG&E HEER/BCE Findings from Program Research, Research Into Action, March 2012 at Review site <http://www.energydataweb.com/cpuc/home.aspx> .

- Lighting has been a large portion of the portfolio for many years in both the residential (including the residential Multifamily Energy Efficiency Rebate program) and commercial sectors, though some measures and program design have been the source of significant concerns and disagreement among parties over free ridership and savings parameter estimates; and
- Pilot and/or new programs such as Energy Upgrade California, or Continuous Energy Improvement that are essential for achieving policy goals and driving innovation in program design are still only operating on a small scale.

## Recommendations

Based on the reported data, many IOU programs in the 2010 – 2012 portfolio appear to be on track to achieve target savings while maintaining overall cost-effectiveness. When field research results, focused on validating the savings estimates, are available next year additional recommendations will be available and will further illuminate what programs and activities are successfully capturing savings. This will help in identifying future opportunities as the market evolves. In the meantime, several recommendations have emerged from evaluations that have been conducted to date that can help improve programs and the overall portfolio:

- Third party and IOU programs may need to offer higher incentives for new technologies, long-term measures, and more integrated

projects to overcome cost barriers among implementers.<sup>26</sup>

- Improve alignment of residential program training (including retailers and contractors) to address gaps in effective program performance and required skill sets;<sup>27</sup>
- Improve data tracking and collection for integrated projects and programs (IDSM); and
- Data tracking and reporting for C&S and ETP are currently being improved to clarify the linkages of these programs with the rest of the portfolio activity.

These recommendations, and the many others found in the detailed evaluation studies, should be factored into adjustments to individual programs or portfolio strategies to maximize future opportunities for energy efficiency to provide quantifiable savings to reach California's multiple policy goals.

## Sources of Additional Information

Several sources of information are available to gain access to the latest evaluation and research on California energy efficiency. Specific studies that have been completed or are pending completion are listed at the end of each chapter of the report.

*Energy Savings status* can be tracked on a monthly basis at the EEGA website [<http://eega.cpuc.ca.gov/>] where savings are reported by the IOUs and detailed

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26 Nonresidential Program Assessments Study, Early Feedback Memorandums, May 2012

27 The 2010 – 2012 WE&T program featured a \$90 million budget for the program cycle and is expected to continue into 2013 – 2014.

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information about the program implementation plans, and annual IOU reports can be found.

*Completed Studies* are made available for comment on Energy Division's evaluation website:

[<http://www.energydataweb.com/cpuc/home.aspx>]

Once the studies are finalized they are archived on the CALMAC website at [www.calmac.org](http://www.calmac.org). On either site one can search for the document by relevant topic or sector, and sign up for automated messages when new studies are completed.

*Pending Studies* and research funded through the Energy Efficiency portfolio can be tracked on the Project Status Report website [<http://www.emvpsr.com/Projects/>] The complete list of studies, their current status, timeline, expected deliverables and contacts can be found on this site.

# Residential



## Overview

With 13.6 million single- and multi-family homes that house 37 million Californians, the residential sector accounts for approximately a third of the state's electric and gas usage.<sup>1</sup> To address the needs and opportunities for savings in this sector, the 2010 – 2012 portfolio included a comprehensive suite of traditional activities (e.g., appliance rebates) for California households. However, with an eye towards advancing the Strategic Plan's goals of zero net energy (ZNE) in the residential sector, the portfolio also introduced new

programs to support a “whole house” approach to achieve deeper energy savings per dwelling (starting with an investment-grade audit, followed by integrated retrofits). By the end of 2011, residential energy efficiency programs appeared to be on track and had reported savings of 132,000 kW, 595 million kWh, and 21 million therms largely through long-running, “traditional” programs.

## Estimated Savings

Eighteen percent of the 2010 – 2012 program cycle budget is allocated to residential energy efficiency, excluding lighting specific programs, and the savings targets for this sector make up 14 percent of the overall portfolio projected savings. As of the end of 2011, the IOUs had spent approximately half of the residential sector budget and had reported energy savings that represent 40 percent of kW, 51 percent

<sup>1</sup> See 2010 Census Interactive Population Search, accessed May 8, 2012, <http://2010.census.gov/2010census/popmap/ipmtext.php?fl=06>; and California Long-term Energy Efficiency Strategic Plan, Section 2, page 9, available at [http://www.cpuc.ca.gov/NR/rdonlyres/A54B59C2-D571-440D-9477-3363726F573A/0/CAEnergyEfficiencyStrategicPlan\\_Jan2011.pdf](http://www.cpuc.ca.gov/NR/rdonlyres/A54B59C2-D571-440D-9477-3363726F573A/0/CAEnergyEfficiencyStrategicPlan_Jan2011.pdf).

of the kWh, and 61 percent of the therm targets for this sector.

**Table 4.** Residential Sector Savings and Budget Snapshot

	Expenditures (million \$)	Energy Savings			CO <sub>2</sub>	Average Program
		kW	kWh	therms	Tons	TRC
<b>Projected</b>	\$531	333,116	1,165,460,198	33,579,469		
<b>Reported</b>	\$262	131,634	595,128,332	20,557,493	450,827	1.27
	49%	40%	51%	61%		

The majority of the residential sector savings claimed come from appliance recycling, household appliances, and consumer electronics. Savings and potential are concentrated in the single-family segment of the residential market (90 percent), despite the fact that 42 percent of California residents rent their homes.<sup>2</sup> Programs that are focused on market transformation and longer-term reductions — such as Energy Upgrade California<sup>3</sup> — do not currently make up a significant portion of the total energy savings in this sector. Appendix C provides savings claims for each residential sector program.

## Residential Energy Efficiency Programs

The 2010 – 2012 statewide programs were designed to achieve energy savings through the adoption of energy efficient products, retrofits and behavior change using rebates, incentives and education. The Home Energy Efficiency Rebate (HEER) program, which offers rebates for high efficiency residential appliances, water heaters, pool pumps, insulation and other high efficiency technologies to single-family home owners, is the largest residential program.<sup>4</sup> Other single-family residential programs include the Appliance Recycling Program (ARP); the Business Consumer Electronics (BCE) program that focuses

<sup>2</sup> See 2010 Census Interactive Population Search, accessed May 8, 2012, <http://2010.census.gov/2010census/popmap/ipm-text.php?fl=06>

<sup>3</sup> Energy Upgrade California program information site, accessed May 11, 2012, <https://energyupgradeca.org/overview>

<sup>4</sup> Lighting programs are the largest residential programs, but they are presented in a separate chapter. The HEER program is the largest by budget, while the ARP program is the largest by projected energy savings.

on plug loads;<sup>5</sup> the Home Energy Efficiency Survey and Universal Audit Tool (UAT) that provide energy saving tips to customers; the HVAC Quality Installation and Quality Maintenance program that improves the efficiency of heating and cooling systems; and a range of behavior-focused comparative usage programs that encourage participants to reduce energy consumption through no-cost energy conservation actions and self-installation of low-cost energy savings measures.<sup>6</sup> Residential programs that target the hard-to-reach multi-family segment include the Multifamily Energy Efficient Rebates (MFEER) and Middle-Income Direct Install (MIDI) programs.<sup>7</sup> Appendix C provides a complete list of residential sector programs and subprograms.<sup>8</sup>

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5 Plug load devices include televisions, set-top boxes, DVD players, music systems, computers, doorbells, alarm systems, toasters, coffee makers, hair dryers, garage door openers, and rechargeable tools.

6 See "Program Guidance for the Residential Sector" pp. 161-214, in Decision D.12-05-015 at [http://docs.cpuc.ca.gov/WORD/PDF/FINAL\\_DECISION/166830.PDF](http://docs.cpuc.ca.gov/WORD/PDF/FINAL_DECISION/166830.PDF). Plug load, appliances and "miscellaneous" uses comprise about 66% of current California home electricity usage, with plug loads accounting for about 20% of home electricity usage alone.

7 The multi-family segment is considered "hard-to-reach" for a number of reasons, including a higher-percentage of low-income residents and the split-incentive issue, in which residents don't own their property or appliances and owners don't reap the energy savings from installed efficiency measures.

8 Detailed program implementation plans and "Program Fact Sheets" can be found on the Energy Division Website: <http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/Statewide+Programs.htm>

## Highlights

Excluding lighting, which is addressed in a separate section of this report, the largest contributors to the IOUs' residential energy savings claims are plug load reductions and retirement of inefficient appliances. The BCE, ARP and HEER programs, respectively account for 34 percent, 30 percent and 14 percent of reported 2010-2011 residential energy savings.<sup>9</sup> Residential programs are generating approximately 10 percent of total reported portfolio savings (34 percent with lighting included).<sup>10</sup>

## Findings

The residential sector savings continue to be driven by "traditional," long-running programs, and evaluations conducted in the past year on the BCE, HEER, MFEER, and EUC activities have identified some significant challenges. Initial evaluation results suggest that:

- The Home Energy Efficiency Rebate (HEER) program suffers from potentially high free-ridership, with 70 percent of participants in certain areas of Southern California indicating no program influence on their decision to purchase rebated energy efficient products;<sup>11</sup>
- The Multifamily Energy Efficiency Rebate program (MFEER), which aimed to derive

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9 *ibid* .

10 Based on IOU Data

11 See SCG 2010-2011 Residential Process Evaluation, Evergreen Economics, pg. 35, March 2012, at [http://www.calmac.org/publications/SCG\\_Res\\_Program\\_Process\\_Eval\\_FINAL.pdf](http://www.calmac.org/publications/SCG_Res_Program_Process_Eval_FINAL.pdf); see SDG&E's 2010-2011 Residential Process Evaluation, Evergreen Economics, March 2012, pg. 57, at [http://www.calmac.org/publications/SDGE\\_Res\\_Process\\_Eval\\_Draft\\_FINAL.pdf](http://www.calmac.org/publications/SDGE_Res_Process_Eval_Draft_FINAL.pdf).

a greater percentage of savings during the program cycle from non-lighting measures, has made some improvements but is still achieving 63 to 99 percent of savings from lighting;<sup>12</sup>

- EUC has reached approximately 4,000 homes out of a targeted 37,000, as the program has been challenged by the housing crisis, limited financing options, high up-front homeowner expenses, and ensuring sufficient contractor skills;<sup>13</sup>
- Training issues hinder effective program delivery in the sector – retail staff needs more education about promoting energy-efficient products for the BCE and HEER programs, while retrofit contractors need more training in EUC programs;<sup>14</sup> and
- Although the plug-load management program was intentionally narrow in scope, so far nearly eighty percent of incentives have been applied to televisions.<sup>15</sup>

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12 See SCE and PG&Es MFEER and CMHP Process Evaluation Presentation, Cadmus Group, May 2012, <http://www.energydataweb.com/cpuc/home.aspx>. Commission directive for the MFEER program is found in Commission Resolution E-4385 at [http://docs.cpuc.ca.gov/word\\_pdf/FINAL\\_RESOLUTION/127632.pdf](http://docs.cpuc.ca.gov/word_pdf/FINAL_RESOLUTION/127632.pdf).

13 See SCE and PG&E Whole House Process Evaluation, Opinion Dynamics and SBW, May 2012, at <http://www.energydataweb.com/cpuc/search.aspx>.

14 See SCE and PG&E HEER/BCE Findings from Program Research, Research Into Action, March 2012 at Review site <http://www.energydataweb.com/cpuc/home.aspx>.

15 See SCE and PG&E HEER/BCE Findings from Program Research, Research Into Action, March 2012, at <http://www.energydataweb.com/cpuc/home.aspx>. Also see Commission Decision D.12-05-015, p. 205, at [http://docs.cpuc.ca.gov/WORD\\_PDF/FINAL\\_DECISION/166830.PDF](http://docs.cpuc.ca.gov/WORD_PDF/FINAL_DECISION/166830.PDF).

## Recommendations

Evaluation studies completed to date provide the following recommendations for improving future residential programs:

- Re-evaluate EUC/Whole House program design and goals, since existing targets may have been too ambitious, particularly given current housing market conditions;<sup>16</sup>
- Improve alignment of residential program training (including retailers and contractors) to address gaps in effective program performance and required skill sets;<sup>17</sup>
- Modify and expand online marketing efforts where necessary to account for the rise in consumer internet research;<sup>18</sup>
- Integrate the plug load management program with existing residential rebate programs;<sup>19</sup> and
- Reformulate the appliance recycling program to include inefficient high-energy consumption

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16 See SCE and PG&E Whole House Process Evaluation, Opinion Dynamics and SBW, May 2012, at <http://www.energydataweb.com/cpuc/search.aspx>.

17 The 2010 – 2012 WE&T program featured a \$90 million budget for the program cycle and is expected to continue into 2013 – 2014.

18 See SCG 2010-2011 Residential Process Evaluation, Evergreen Economics, March 2012, pg. 43, at [http://www.calmac.org/publications/SCG\\_Res\\_Program\\_Process\\_Eval\\_FINAL.pdf](http://www.calmac.org/publications/SCG_Res_Program_Process_Eval_FINAL.pdf); see SDG&E's 2010-2011 Residential Process Evaluation, Evergreen Economics, March 2012, pg. 65, at [http://www.calmac.org/publications/SDGE\\_Res\\_Process\\_Eval\\_Draft\\_FINAL.pdf](http://www.calmac.org/publications/SDGE_Res_Process_Eval_Draft_FINAL.pdf).

19 See SCE and PG&E HEER/BCE Findings from Program Research, Research Into Action, March 2012, at <http://www.energydataweb.com/cpuc/home.aspx>.

and secondary units and to include the multi-family sector.<sup>20</sup>

## For More Information

Findings from initial evaluation results included in this chapter and studies related to several residential programs and residential market studies may be found at [www.calmac.org](http://www.calmac.org) and [www.energydataweb.com](http://www.energydataweb.com).

These studies are listed below:

Completed Studies:

- *ARP Retailer Trial* — SCE (not yet posted)
- *SCE and PG&Es MFEER and CMHP Process Evaluation Presentation*, Cadmus Group, May 2012, <http://www.energydataweb.com/cpuc/home.aspx>
- *SCG 2010 – 2011 Residential Process Evaluation*, Evergreen Economics, March 2012, at [http://www.calmac.org/publications/SCG\\_Res\\_Program\\_Process\\_Eval\\_FINAL.pdf](http://www.calmac.org/publications/SCG_Res_Program_Process_Eval_FINAL.pdf)
- *Reconsidering What We Measure: A White Paper — Residential Decision Making and Proposed Questionnaire Items*, Opinion Dynamics, Research Into Action, August 2011, [http://calmac.org/publications/Reconsidering\\_What\\_We\\_Measure.pdf](http://calmac.org/publications/Reconsidering_What_We_Measure.pdf)
- *SDG&E's 2010 – 2011 Residential Process Evaluation*, Evergreen Economics, March 2012, at [http://www.calmac.org/publications/SDGE\\_Res\\_Process\\_Eval\\_Draft\\_FINAL.pdf](http://www.calmac.org/publications/SDGE_Res_Process_Eval_Draft_FINAL.pdf)

<sup>20</sup> See Commission Decision D.12-05-015, pg. 205, at [http://docs.cpuc.ca.gov/WORD\\_PDF/FINAL\\_DECISION/I66830.PDF](http://docs.cpuc.ca.gov/WORD_PDF/FINAL_DECISION/I66830.PDF).

- *National Awareness of ENERGY STAR® for 2011: Analysis of 2011 CEE Household Survey*. U.S. EPA, 2012, <http://www.energystar.gov/ia/partners/publications/pubdocs/National%20Awareness%20of%20ENERGY%20STAR%202011.pdf>
- *Residential Appliance Saturation Survey (RASS) Oversample* (not yet posted)
- *Market Characterization & Residential General*
- *Population Survey for Homeowners/Renters* (not yet posted)

In addition, nine studies specific to the residential sector are either currently underway or planned for completion in the first quarter of 2013. The following studies provide information on the savings achieved in the current program cycle based on field analysis, influence of the programs on market actors, program performance assessments, and market research:

- Evaluation of PG&E's and SDG&E's OPOWER Pilot Programs
- Overarching Process Evaluation of All Residential Programs
- Lighting Programs Process Evaluation and Market Characterization
- Residential On-Site/Metering Survey
- Residential Market Share Tracking
- Residential/Advanced/Upstream Lighting Impact Evaluation
- Consumer Electronics and Plug Load Impact Evaluation
- Residential Appliance Recycle Refrigerator and Freezer Impact Evaluation
- Residential Whole Building — Retrofit Impact Evaluation



# Commercial



## Overview

The commercial sector represents 5 billion-plus square feet of highly diverse space — not only office buildings but also retail stores, restaurants, warehouses, schools, hospitals, public buildings and others.<sup>1</sup> Commercial buildings consume more electricity than any other sector in California constituting 38 percent of the state’s power use and over 25 percent of natural gas consumption.<sup>2</sup> Given the large portion of energy use that comes from this sector, commercial buildings are the focus of several state policies focused on substantially reducing building energy usage within

<sup>1</sup> See Appendix C for a list of programs that are categorized as commercial for this chapter.

<sup>2</sup> CPUC Strategic Plan Progress Report, October 2011, <http://www.cpuc.ca.gov/NR/rdonlyres/5D0472D1-0D21-46D5-8A00-B223B8C70340/0/StrategicPlanProgressReportOct2011.pdf>

this sector. Two recent bills expected to have significant impact for commercial buildings include AB 1103 (Saldana, 2007),<sup>3</sup> which requires building benchmarking and disclosure at time of sale<sup>4</sup>, and AB 758 (Skinner, 2009), which requires the CEC and CPUC to create and implement a comprehensive retrofit program for existing buildings through targeted development of workforce and training infrastructure; transformation of energy assessment, retrofit, and finance markets; and requirements for energy ratings

<sup>3</sup> Requires disclosure at the time of sale and lease of a non-residential building energy use score from Energy Star Portfolio Manager for the previous 12 months.

<sup>4</sup> Benchmarking provides a baseline diagnostic of energy usage, and can be used to compare building performance as well as develop a plan for continuous energy efficiency improvements. Benchmarking is considered a gateway to more aggressive energy savings as identified in the Strategic Plan.

**Table 5.** Commercial Sector Savings and Budget Snapshot

	Expenditures	Energy Savings			CO <sub>2</sub>	Average Program Cost effectiveness
	Million \$	kW	kWh	therms	Tons	TRC
<b>Projected</b>	\$936	588,065	2,937,172,382	38,556,286		
<b>Reported</b>	\$619	413,783	2,111,239,882	22,715,521	1,344,041	2.11
<b>% of Projected</b>	66%	70%	72%	59%		

and upgrades.<sup>5</sup> In parallel with these legislative activities and mandates, the IOU commercial programs are ongoing, creating efficiency awareness through audits, rebates, and education.

### Estimated Savings

The commercial sector programs account for about one-third of the total portfolio budget and similarly about one-third of the total projected electric savings. Three-quarters of the reported commercial sector savings result from long-running incentive programs. Through the end of 2011 they have spent \$619 million of an \$936 million budget and have saved a reported 2.1 billion kWh, 413 MW, and 22 million therms for the 2010 – 2012 program cycle thus far, and represents about 70 percent of the electric savings targets for this sector.

### Program Summary

California's 2010 – 2012 energy efficiency portfolio includes 107 programs and sub programs that target a wide range of large, medium, and small commercial customers.<sup>6</sup> These programs reach commercial customers through standard rebate programs with a pre-set menu of measures and incentives; direct install programs that provide low- or no-cost assessments and installation services; customized projects for large commercial customers; and new construction design assistance. Programs are focused on specific target markets, due to the variety of commercial building types and functions, including: distribution warehouses, office buildings, hotels, motels, restaurants, schools, universities, colleges, hospitals, high-tech facilities, bio-tech facilities, retail facilities, entertainment centers, and smaller commercial customers that

<sup>5</sup> Assembly Bill 758 can be found at: <http://www.energy.ca.gov/ab758/>

<sup>6</sup> Institutional Partnerships with the Department of Corrections and the University of California for example have been included in this sector.

have similar buying characteristics.<sup>7</sup> Vendors and contractors are the key delivery channels, working with manufacturers and retailers to reach customers and identify savings. Internally, the IOUs coordinate amongst their business divisions to ensure an integrated delivery of products and services to businesses, and the IOUs share approaches / best practices with one another. The primary technologies that are supported by commercial sector programs are indoor lighting, HVAC, whole building, refrigeration, building envelope, and plug loads (see appendix C). Building benchmarking<sup>8</sup> is a relatively new activity that has been incorporated into a number of existing commercial programs to support the state's goal of benchmarking its 50,000 commercial and institutional buildings.<sup>9</sup>

## Highlights

Over the course of program implementation, the commercial programs have experienced some modifications to standardize savings and expand participation. For example, for the Non-Residential Audit program, SoCalGas reported expansion of retro-commissioning (RCx) efforts to standardize energy savings calculations for high impact measures, and SCE created and rolled out the Statewide RCx Policy Manual. The IOU calculated incentives programs introduced integrated solutions such as iBonus for applications with measures including Automatic Demand Response. The deemed incentive

program increased customized measures available and expanded outreach to trade professionals and other delivery channels. The Direct Install program expanded marketing and collaboration amongst various internal and external stakeholders to stimulate greater participation, including a district approach to serve customers.<sup>10</sup>

## Key Findings

A large research effort is currently underway for commercial sector programs. These studies include a comprehensive commercial lighting impact study and a statewide commercial sector 'saturation' study that will profile the stock of energy-using equipment in California's commercial buildings. Several studies were completed in the first quarter of 2012, and key findings from these studies are provided in this subsection.

A cross-cutting characterization and best practices assessment study of the non-residential portfolio provided interim findings in the area of commercial third party and IOU-led incentive programs. The study highlighted some of the key tradeoffs among the strategies each IOU has used for administering third party programs, which may be important if the third party model is expected to deliver a larger portion of the portfolio's savings in the future.<sup>11</sup> Key findings from this study include:

- Despite policy objectives encouraging deep, long-term energy savings, many commercial

7 IOU Annual Reports, filed May 1, 2012. <http://eega.cpuc.ca.gov/Documents.aspx>

8 Benchmarking refers to the assessment of a building's energy use and comparing it to the energy use of other buildings as a comparative metric of efficiency.

9 D.09-09-047 at page 153

10 IOU Annual Reports, filed May 1, 2012. <http://eega.cpuc.ca.gov/Documents.aspx>

11 Nonresidential Program Assessments Study, Early Feedback Memorandums, May 2012

efficiency projects continue to focus on short-term payback and savings that may incent large projects but not necessarily deeper savings;

- Competition amongst third parties for energy efficiency services can lead to customer confusion, but does allow customers multiple options with an elevated quality of service;
- While third party program implementers may have both the skills and the interest to maximize demand response participation while delivering energy efficiency, current third party compensation terms are not enough to motivate cross-promotion of programs; and
- Higher incentives should be made available for new technologies, especially those with a longer payback, to help offset the resistance of program implementers in the commercial sector to promote new technologies.

A recent study on benchmarking examined the utility of building benchmarking in promoting energy efficiency, the value of existing and emerging benchmarking tools to California buildings, and other issues. Key findings from the study include: Sixty percent of buildings benchmarked reported improved building energy management and eighty-four percent implemented or planned to implement building improvements;

- Most commonly, benchmarking is used to set a baseline score or EUI for future comparison, followed by raising awareness about energy efficiency opportunities in buildings and portfolios, and setting a goal for future building's performance over time;
- While state and local laws may drive some interest in benchmarking, vendors are essential to the success of benchmarking;

- Motivations to benchmark included State & local (e.g. San Francisco) laws as well as the desire for a green building label like LEED or Energy Star, which increase occupancy rates, lease rates and a buildings overall assets thereby increasing the real estate value; and
- Benchmarking was confusing and difficult for some, and outside of those who used IOU benchmarking services, the process is not widely known and is little used.

Two other studies conducted for the Sempra utilities (SDG&E and SCG) provide feedback regarding implementation successes and challenges across several commercial statewide, local and third party programs.<sup>12,13</sup> While the findings were largely specific to the Sempra programs, several key findings with broader implications include recommendations to automate application processes, track customers that refuse programs, create case studies, and provide "kickers" for complex emerging technologies.

### Recommendations

The commercial sector studies completed to date offer detailed recommendations for improving programs and initiatives in the commercial sector. Third party and IOU programs may need to offer higher incentives for new technologies, long-term measures, and more integrated projects to overcome cost

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<sup>12</sup> SDG&E Non-Residential Process Evaluation Study: Main Report, Heschong Mahone Group, March 2012  
[http://www.calmac.org/publications/SDGE\\_NR\\_Process\\_Eval\\_Final\\_Report\\_-\\_Main\\_Report.pdf](http://www.calmac.org/publications/SDGE_NR_Process_Eval_Final_Report_-_Main_Report.pdf)

<sup>13</sup> SCG Non-Residential Process Evaluation Study: Main Report, Heschong Mahone Group, March 2012  
[http://www.calmac.org/publications/SCG\\_NR\\_Process\\_Eval\\_Final\\_Report\\_-\\_Main\\_Report.pdf](http://www.calmac.org/publications/SCG_NR_Process_Eval_Final_Report_-_Main_Report.pdf)

barriers among implementers. To encourage greater integration of energy efficiency, demand response and distributed generation offerings, alignment of the regulatory cycles for these strategies may be helpful, but other significant barriers will remain. The link between audits and energy efficiency action may be improved by tying account executive incentives to an audit conversion rate, and restructuring third party contract terms and conditions may encourage deep retrofits.<sup>14</sup> With respect to building benchmarking, several threshold barriers related to policies, tools and IOU data management will have to be addressed for benchmarking to continue to gain traction in the market.<sup>15</sup>

### For More Information

Findings from initial evaluation results included in this chapter and studies related to several residential programs and residential market studies may be found at [www.calmac.org](http://www.calmac.org) and [www.energydataweb.com](http://www.energydataweb.com). These studies are listed below:

### Completed Studies:

- *Non Residential Program Assessments Study, Early Feedback Memorandums*, May 2012 (full report pending July 2012)
- *Statewide Benchmarking Process Evaluation; ERS*, April 2012 [http://www.energydataweb.com/cpucFiles/pdaDocs/837/Benchmarking%20](http://www.energydataweb.com/cpucFiles/pdaDocs/837/Benchmarking%20Report%20(Volume%201)%20w%20CPUC%20Letter%204-11-12.pdf)

<sup>14</sup> Nonresidential Program Assessments Study, Early Feedback Memorandums, May 2012

<sup>15</sup> Statewide Benchmarking Process Evaluation; ERS, April 2012 [http://www.energydataweb.com/cpucFiles/pdaDocs/837/Benchmarking%20Report%20\(Volume%201\)%20w%20CPUC%20Letter%204-11-12.pdf](http://www.energydataweb.com/cpucFiles/pdaDocs/837/Benchmarking%20Report%20(Volume%201)%20w%20CPUC%20Letter%204-11-12.pdf)

[Report%20\(Volume%201\)%20w%20CPUC%20Letter%204-11-12.pdf](http://www.calmac.org/publications/SDGE_NR_Process_Eval_Final_Report_-_Main_Report.pdf)

- *SDG&E Non-Residential Process Evaluation Study: Main Report, Heschong Mahone Group*, March 2012  
[http://www.calmac.org/publications/SDGE\\_NR\\_Process\\_Eval\\_Final\\_Report\\_-\\_Main\\_Report.pdf](http://www.calmac.org/publications/SDGE_NR_Process_Eval_Final_Report_-_Main_Report.pdf)
- *SCG Non-Residential Process Evaluation Study: Main Report, Heschong Mahone Group*, March 2012  
[http://www.calmac.org/publications/SCG\\_NR\\_Process\\_Eval\\_Final\\_Report\\_-\\_Main\\_Report.pdf](http://www.calmac.org/publications/SCG_NR_Process_Eval_Final_Report_-_Main_Report.pdf)

### Pending Studies:

A comprehensive review of the energy savings impacts is pending for the commercial sector and will be available by the first quarter of 2013. Studies that will inform this assessment include review of commercial programs and projects on lighting, large commercial custom projects, and heating ventilation and cooling. The following studies are in the field or pending for the 2010 – 2012 program cycle:

- Overarching Process Evaluation of All Nonresidential Programs
- HVAC Programs Process Evaluation and Market Characterization
- Commercial Saturation Survey/CMST
- Non-residential Downstream Lighting Impact Evaluation
- Residential and Small Com HVAC Impact Evaluation

### Other Resources:

A statewide inventory of commercial buildings will have preliminary results in the first quarter of 2013.

Additionally, the CEC will be posting their AB 758 Scoping Report by September 2012, and soliciting public comments on the various market needs for whole building retrofit, ratings, and disclosures.

# Industrial and Agriculture



## Overview

Two of California's biggest economic forces are also two of California's biggest energy consumers, with the industrial and agricultural sectors accounting for approximately 22 and 7 percent of the state's electricity consumption, respectively.<sup>1</sup> Consequently, improving the efficiency of agricultural and industrial processes presents a significant energy savings opportunity. The industrial programs in the 2010 – 2012 energy efficiency portfolio are intended to support the vision of the Strategic Plan to "significantly improve overall energy performance and help meet both private-sector and national goals for energy and the environment" while agricultural programs "will

support the long-term economic environmental success of California agriculture."<sup>2</sup>

## Estimated Savings

After two years of program activity, the IOUs have spent approximately half of their industrial and agricultural sector budgets, and on a self-reported basis they have achieved more than half of their electricity savings targets and approximately 67 percent of their therm savings targets.

<sup>1</sup> California Energy Efficiency Strategic Plan (p. 38 and p. 46)

<sup>2</sup> See Commission Decision D.09-09-047 at sections 5.5 Statewide Industrial Programs and 5.6 Agricultural Programs. <http://docs.cpuc.ca.gov/Published/Graphics/107829.pdf>

**Table 6.** Industrial Sector Savings and Budget Snapshot

	Expenditures	Energy Savings			CO <sub>2</sub>	Average Program Cost effectiveness
	Million \$	kW	kWh	therms	Tons	TRC
<b>Projected</b>	\$531	244,244	1,494,733,076	112,135,808		
<b>Reported</b>	\$262	141,940	803,830,463	75,900,625	891,068	1.56
<b>% of Projected</b>	49%	58%	52%	68%		

In the 2010 – 2012 portfolio, industrial and agricultural programs were allocated \$531 million, 18 percent of the total portfolio budget. The electric, demand and natural gas savings were projected to account for 17, 14 and 64 percent of the portfolio, respectively. Based on expenditures to date and the claimed (but unverified)<sup>3</sup> savings, activities in these sectors account for about 16 percent of portfolio expenditures, 12 percent of electric and demand savings, and 56 percent of natural gas savings.

### Industrial Programs

There are 25 industrial programs and 13 agricultural programs in the portfolio. Some programs are directed to specific market segments, such as refineries, wastewater treatment, and dairies, or specific technologies, such as boilers and air compressors. Energy efficiency projects in the industrial and agriculture sectors generally focus on process improvements or retrofitting opportunities, but also include standardized and new construction projects. For a majority of projects, energy savings are calculated on a “custom” basis and incentives paid on the basis of the energy saved.

In addition, the 2010 – 2012 portfolio introduced a new pilot program aligned with the Strategic Plan called Continuous Energy Improvement (CEI),<sup>4</sup> a comprehensive energy management approach that includes performance tracking for purposes of greenhouse gas emissions (AB32) and energy efficiency

3 Past studies for the industrial and ag sectors have found reported savings to be overstated by as much as 50 percent (see, e.g., 2006-2008 Evaluation Report for PG&E Fabrication, Process and Manufacturing Contract Group, Itron, February 3, 2010 p. 1-2, available at [http://calmac.org/publications/PG&E\\_Fab\\_06-08\\_Eval\\_Final\\_ReportES.pdf](http://calmac.org/publications/PG&E_Fab_06-08_Eval_Final_ReportES.pdf); Evaluation Report: PG&E Agricultural and Food Processing Program -- Greenhouse Heat Curtain and Infrared Film Measures, Itron, February 10, 2010, p. xii, available at [http://calmac.org/publications/PG&E\\_Ag-Food\\_Eval\\_Report\\_VI\\_021010.pdf](http://calmac.org/publications/PG&E_Ag-Food_Eval_Report_VI_021010.pdf)

4 Funding for this program activity is about 1.15% of the budget for industrial and Ag programs.

efforts. By the end of 2011, the IOUs had enrolled 31 industrial customers and seven agricultural customers (nine had created energy plans), which is consistent with the CEI pilot<sup>5</sup> program's objectives, but represents a small portion of the potential customer base.

## Highlights

Industrial and agricultural programs have continued to deliver significant energy savings in the 2010 – 2012 portfolio. In this program cycle, the CPUC has introduced a process to review and approve project savings estimates prior to implementing projects.<sup>6</sup> The intent of the early review process is to reduce the gap between utility claimed savings and evaluated savings and to provide immediate feedback to the utilities with respect to savings calculation methodologies and program influence metrics, among other things. In addition, after many years of custom program interventions and relatively little modification in program design, the introduction of CEI also offers new opportunities for capturing long term savings in these sectors.

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5 The 2013- 2014 guidance decision adopted by the Commission on May 10, 2012, directs the CEI program to serve as an integrated pilot program for IDSM strategic planning, and directs the IOUs to expand the program to mid-sized businesses.

6 This is referred to as the Ex-Ante Review (EAR) process. See Commission Decision 11-07-030, available at [http://docs.cpuc.ca.gov/word\\_pdf/FINAL\\_DECISION/139860.pdf](http://docs.cpuc.ca.gov/word_pdf/FINAL_DECISION/139860.pdf); Decision 12-05-015, p. 344 ("Our adopted custom measure and project review process was conceived both to help motivate improvements to the ex ante values for those projects and to motivate the utilities to respond to Commission Staff reviews with appropriate program design changes"), available at [http://docs.cpuc.ca.gov/word\\_pdf/FINAL\\_DECISION/166830.pdf](http://docs.cpuc.ca.gov/word_pdf/FINAL_DECISION/166830.pdf).

## Findings

To understand the full impacts of industrial and agricultural programs on energy savings, a comprehensive suite of field-based evaluations is being conducted, with preliminary results expected by the end of 2012 (and final results by the end of 2013). Although findings from the field evaluations were not available for this report, two program assessments have reported findings relevant to the industrial and agriculture sector, and eight market characterization studies have been completed.

Two program assessment studies were conducted to look at best practices for a large portion of the state's nonresidential portfolio of programs. They include an assessment of IOU-run industrial and agricultural programs<sup>7</sup> and an assessment of 28 third party industrial and agricultural programs.<sup>8</sup> The program assessments identify and discuss best practices in program implementation in these sectors and make numerous recommendations with respect to:<sup>9</sup>

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7 Nonresidential Program Assessments Study, Core Calculated Program Group Draft Report, June 2012, at <http://www.energydataweb.com/cpuc/home.aspx>.

8 Nonresidential Program Assessments Study, Third Party Industrial and Agriculture Program Group, Early Feedback Memorandum, May 2012, at <http://www.energydataweb.com/cpuc/home.aspx>.

9 See Nonresidential Program Assessments Study, Core Calculated Program Group Draft Report, June 2012, p. 30; Nonresidential Program Assessments Study, Third Party Industrial and Agriculture Program Group, Itron, July 2012, <http://www.energydataweb.com/cpuc/home.aspx>.

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- Adapting programs to support the pursuit of long term savings, deep retrofits or market transformation;<sup>10</sup>
- Overcoming hurdles in providing integrated offerings for energy efficiency, demand response, and distributed generation within programs or for specific projects that arise from administrative and regulatory barriers and the programs' heavy reliance on incentives for direct energy savings;<sup>11</sup>
- Achieving, for core calculated programs, the horizontal integration of program and project data, as well as cross-program databases, customer relationship management systems, and invoicing systems, while vertically integrating systems with upstream and downstream stakeholders including customers, account executives, vendors, third parties, evaluators and the CPUC;<sup>12</sup>
- Dedicating core calculated program staff to the development of marketing strategy and materials and leverage the extensive marketing efforts of the private sector;<sup>13</sup>
- Increasing third party program opportunities for coordination with IOUs, including co-branding, leveraging marketing and working closely with account executives;<sup>14</sup>
- Considering different contracting models for third party implementers in addition to paying for performance (such as offering bonus incentives to third party implementers and their customers for pursuing long-term savings objectives);<sup>15</sup> and
- Addressing opportunities for incorporating innovative program design elements, particularly in third party programs.<sup>16</sup>

Although opportunities exist for program improvements, best practices are generally being followed in this sector with respect to marketing, project management, customer service and installation and service delivery mechanisms.

Finally, market characterization studies were completed in 2012 for eight industrial market segments: plastics; mineral product manufacturing; metalworking; chemicals; cement and concrete; paper; water and wastewater; and glass. These studies were designed to better understand factors that affect program participation or opportunities in the market, including

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10 Nonresidential Program Assessments Study, Core Calculated Program Group Draft Report, June 2012; Nonresidential Program Assessments Study, Third Party Industrial and Agriculture Program Group, Itron, July 2012, <http://www.energy-dataweb.com/cpuc/home.aspx>.

11 Nonresidential Program Assessments Study, Core Calculated Program Group Draft Report, June 2012; Nonresidential Program Assessments Study, Third Party Industrial and Agriculture Program Group, Itron, July 2012, <http://www.energy-dataweb.com/cpuc/home.aspx>.

12 Nonresidential Program Assessments Study, Core Calculated Program Group Draft Report, June 2012, p. 14-15.

13 Nonresidential Program Assessments Study, Third Party Industrial and Agriculture Program Group, Itron, July 2012, pp. 18-19 <http://www.energydataweb.com/cpuc/home.aspx>

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14 Nonresidential Program Assessments Study, Third Party Industrial and Agriculture Program Group, Itron, July 2012, pp. 11-12, <http://www.energydataweb.com/cpuc/home.aspx>.

15 Nonresidential Program Assessments Study, Third Party Industrial and Agriculture Program Group, Itron, July 2012, pp. 18-19, <http://www.energydataweb.com/cpuc/home.aspx>

16 Nonresidential Program Assessments Study, Core Calculated Program Group Draft Report, June 2012, p. 30; Nonresidential Program Assessments Study, Third Party Industrial and Agriculture Program Group, Itron, July 2012, <http://www.energy-dataweb.com/cpuc/home.aspx>.

business cycles, the likelihood the customers would be making large capital investments, and internal decision frameworks regarding energy use and efficiency.<sup>17</sup>

## Recommendations

Programs in this sector should be guided by the program assessment best practices recommendations, including improvements that encourage comprehensive and deep retrofits, pursuit of long-term savings, outreach to hard-to-reach customers, and integration of energy efficiency offerings with demand response and distributed generation. In addition, expansion of the CEI program, and developing associated evaluation strategies, would support the goals set forth in

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17 Industrial Sectors Market Characterization, Plastics Industry, KEMA, February 2012, [http://calmac.org/publications/Final\\_Plastics\\_Market\\_Characterization.pdf](http://calmac.org/publications/Final_Plastics_Market_Characterization.pdf); Industrial Sectors Market Characterization, Mineral Product Manufacturing Industry, KEMA, January 2012, [http://calmac.org/publications/Final\\_Minerals\\_Market\\_Characterization\\_Report.pdf](http://calmac.org/publications/Final_Minerals_Market_Characterization_Report.pdf); Industrial Sectors Market Characterization, Metalworking Industry, KEMA, February 2012, [http://calmac.org/publications/Final\\_metalworking\\_market\\_characterization\\_report.pdf](http://calmac.org/publications/Final_metalworking_market_characterization_report.pdf); Industrial Sectors Market Characterization, Paper Industry, KEMA, January 2012, [http://calmac.org/publications/Final\\_Paper\\_Industrial\\_Sector\\_Market\\_Characterization.pdf](http://calmac.org/publications/Final_Paper_Industrial_Sector_Market_Characterization.pdf); Industrial Sectors Market Characterization, Chemicals Industry, KEMA, February 2012, [http://calmac.org/publications/Final\\_Industrial\\_Sector\\_Market\\_Characterization\\_Chemicals\\_Report.pdf](http://calmac.org/publications/Final_Industrial_Sector_Market_Characterization_Chemicals_Report.pdf); Industrial Sectors Market Characterization, Glass Industry, KEMA, January 2012, [http://calmac.org/publications/Final\\_Industrial\\_Glass\\_Sector\\_Characterization\\_Report.pdf](http://calmac.org/publications/Final_Industrial_Glass_Sector_Characterization_Report.pdf); Industrial Sectors Market Characterization, Cement and Concrete Industry, KEMA, February 2012, [http://calmac.org/publications/Final\\_Cement\\_Industrial\\_Market\\_Characterization\\_Report.pdf](http://calmac.org/publications/Final_Cement_Industrial_Market_Characterization_Report.pdf); Industrial Sectors Market Characterization, Water and Wastewater Industry, KEMA, January 2012, [http://calmac.org/publications/Final\\_Industrial\\_Sector\\_Market\\_Characterization\\_Water\\_Wastewater.pdf](http://calmac.org/publications/Final_Industrial_Sector_Market_Characterization_Water_Wastewater.pdf).

the Strategic Plan. Finally, the early review process adopted by the Commission for custom projects<sup>18</sup> should continue to be refined and expanded.<sup>19</sup>

## For More Information

Findings from initial evaluation results included in this chapter and studies related to several industrial and agricultural programs and market studies may be found at [www.calmac.org](http://www.calmac.org) and [www.energydataweb.com](http://www.energydataweb.com). These studies are listed below:

### Completed Studies:

- *Non Residential Program Assessments Study, Third Party Industrial and Agriculture Program Group Draft Report*, ERS and Itron, July 2012, at <http://www.energydataweb.com/cpuc/home.aspx>.
- *Non Residential Program Assessment Study, Core Calculated Program Group Draft Report*, ERS and Itron, July 2012, at <http://www.energydataweb.com/cpuc/home.aspx>.
- *SDG&E Non-Residential Process Evaluation Study: Main Report*, Heschong Mahone Group, March 2012  
[http://www.calmac.org/publications/SDGE\\_NR\\_Process\\_Eval\\_Final\\_Report\\_-\\_Main\\_Report.pdf](http://www.calmac.org/publications/SDGE_NR_Process_Eval_Final_Report_-_Main_Report.pdf)
- *SCG Non-Residential Process Evaluation Study: Main Report*, Heschong Mahone Group, March 2012  
[http://www.calmac.org/publications/SCG\\_NR\\_Process\\_Eval\\_Final\\_Report\\_-\\_Main\\_Report.pdf](http://www.calmac.org/publications/SCG_NR_Process_Eval_Final_Report_-_Main_Report.pdf)

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18 Decision 11-070-030, Decision 12-05-015.

19 No more than 100 projects are expected to go through ex ante review in the 2010-12 portfolio period.

### **Eight Market Studies:**

- *Industrial Sectors Market Characterization, Plastics Industry*, KEMA, February 2012, [http://calmac.org/publications/Final\\_Plastics\\_Market\\_Characterization.pdf](http://calmac.org/publications/Final_Plastics_Market_Characterization.pdf);
- *Industrial Sectors Market Characterization, Mineral Product Manufacturing Industry*, KEMA, January 2012, [http://calmac.org/publications/Final\\_Minerals\\_Market\\_Characterization\\_Report.pdf](http://calmac.org/publications/Final_Minerals_Market_Characterization_Report.pdf);
- *Industrial Sectors Market Characterization, Metalworking Industry*, KEMA, February 2012, [http://calmac.org/publications/Final\\_metal-working\\_market\\_characterization\\_report.pdf](http://calmac.org/publications/Final_metal-working_market_characterization_report.pdf);
- *Industrial Sectors Market Characterization, Paper Industry*, KEMA, January 2012, [http://calmac.org/publications/Final\\_Paper\\_Industrial\\_Sector\\_Market\\_Characterization.pdf](http://calmac.org/publications/Final_Paper_Industrial_Sector_Market_Characterization.pdf);
- *Industrial Sectors Market Characterization, Chemicals Industry*, KEMA, February 2012, [http://calmac.org/publications/Final\\_Industrial\\_Sector\\_Market\\_Characterization\\_Chemicals\\_Report.pdf](http://calmac.org/publications/Final_Industrial_Sector_Market_Characterization_Chemicals_Report.pdf);
- *Industrial Sectors Market Characterization, Glass Industry*, KEMA, January 2012, [http://calmac.org/publications/Final\\_Industrial\\_Glass\\_Sector\\_Characterization\\_Report.pdf](http://calmac.org/publications/Final_Industrial_Glass_Sector_Characterization_Report.pdf);
- *Industrial Sectors Market Characterization, Cement and Concrete Industry*, KEMA, February 2012, [http://calmac.org/publications/Final\\_Cement\\_Industrial\\_Market\\_Characterization\\_Report.pdf](http://calmac.org/publications/Final_Cement_Industrial_Market_Characterization_Report.pdf);
- *Industrial Sectors Market Characterization, Water and Wastewater Industry*, KEMA, January 2012, [http://calmac.org/publications/Final\\_Industrial\\_Sector\\_Market\\_Characterization\\_Water\\_Wastewater.pdf](http://calmac.org/publications/Final_Industrial_Sector_Market_Characterization_Water_Wastewater.pdf).

### **Pending Studies:**

Field based evaluation of projects in the industrial and agricultural programs is underway. An interim report will be available by the end of 2012.<sup>20</sup> Priorities of this evaluation include estimating the level of achieved impact savings in the field, and estimating the influence of the program on participant action.

The 2010 – 2012 Statewide Agriculture Market Assessment and Energy Efficiency Potential Study is also underway. This report will provide information to better understand the IOUs' agricultural customers, their energy consumption and opportunities for energy efficiency, demand response and self-generation. It is the first step in meeting sector goals set out in the California Energy Efficiency Strategic Plan. A draft report is expected in August 2012 and a final report by the end of 2012.

An evaluation of the implementation of the CEI Pilot Program is also underway with a final report expected in late 2012.

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<sup>20</sup> The report will cover savings claims made through July 2011.

# Heating, Ventilation, and Air Conditioning



## Overview

The rapid growth of air conditioning units in California has made it one of the largest energy end uses and the single largest contributor to peak demand. Currently, cooling buildings comprises up to 30 percent of total demand in the hot summer months, and it is estimated that poor installation and maintenance may result in lost potential energy savings of 20 to 30 percent.<sup>1</sup>

As air conditioning use has increased, the state has struggled to make the units more efficient and develop a sustainable, quality-focused Heating

Ventilation and Air Conditioning (HVAC) industry. In an attempt to address these issues, the Strategic Plan called for a “transformation” of the industry to ensure that HVAC technology, equipment, installation, and maintenance are of the highest quality to promote energy efficiency and peak load reductions. To help meet these objectives, the IOUs have designed four programs to transform the industry by encouraging the purchase of highly efficient HVAC units and demonstrating to the property owner that quality installation and proper maintenance of HVAC systems leads to increased savings, greater comfort, and improved indoor air quality.

## Estimated Savings

After two years, the four HVAC-specific programs have nearly reached half of their electric and demand savings targets and 21 percent of their natural gas

<sup>1</sup> California Energy Commission, Strategic Plan to Reduce the Energy Impact of Air Conditioners (June 2008), <http://www.energy.ca.gov/2008publications/CEC-400-2008-010/CEC-400-2008-010.PDF>

targets. The HVAC programs were budgeted at about 4 percent of the portfolio. Savings from these HVAC-specific programs represent almost 2 percent of the claimed electricity savings through 2011, and 5 percent of the peak load impacts, and less than one percent of natural gas impacts. Based on expenditures to date HVAC programs have spent about three-quarters of their projected budget to achieve

these savings. However, multiple programs, found throughout the portfolio (i.e. commercial and residential sectors), include improving the efficiency of HVAC systems as a program element. If the HVAC savings from programs throughout the portfolio are counted, they constitute 9 percent of electric savings, 13 percent of peak demand savings and 18 percent of natural gas savings.

**Table 7.** HVAC Sector Savings and Budget Snapshot

	Expenditures	Energy Savings			CO <sub>2</sub>	Average Program Cost effectiveness
	Million \$	kW	kWh	therms	Tons	TRC
<b>Projected</b>	\$124	112,365	180,711,593	819,187		
<b>Reported</b>	\$86	55,716	95,258,463	173,620	60,685	2.16
<b>% of Projected</b>	69%	50%	53%	21%		

## HVAC Programs

The IOUs' four HVAC rebate programs include: the Upstream Equipment Incentive, Commercial Quality Installation, Residential Quality Installation and Residential & Commercial Quality Maintenance.<sup>2</sup> Together, these programs encourage the adoption of industry backed, nationally and internationally vetted installation and maintenance standards accredited by the American National Standards Institute (ANSI); educate the contractor and property owner about energy efficiency choices and promote the best tech-

nologies available. The Upstream HVAC Equipment Incentive program is the most successful of these programs at achieving direct energy savings and, on a reported basis, has achieved cost effective energy savings and met its energy savings goals. An evaluation of this program is currently underway to validate the savings claims.

## Highlights

The HVAC industry has achieved a number of successful outcomes. Based on the IOUs' projected savings, the Upstream HVAC Equipment Incentive program appears to be reaching its energy savings goals due to a programmatic change which provided the

<sup>2</sup> For budgets and energy savings estimates see <http://eega.cpsc.ca.gov/>

incentive to the distributor.<sup>3</sup> In addition, the Western HVAC Performance Alliance (WHPA) has effectively galvanized stakeholders from the IOUs, academia and the HVAC industry to work together on the most pressing challenges facing the industry, including a “Commercial Quality Maintenance Standard” (Standard 180) embraced in the U.S. and a number of other countries throughout the world.

## Recommendations

As of June 2012, multiple HVAC evaluation studies are underway. Recommendations for the HVAC sector programs will be developed after these early findings are available.

## For More Information

Findings from initial evaluation results included in this chapter and studies related to HVAC may be found at [www.calmac.org](http://www.calmac.org) and [www.energydataweb.com](http://www.energydataweb.com). These studies are listed below:

### Pending Studies:

A comprehensive portfolio of HVAC research is currently underway and most are slated for completion in early 2013 and research plans for each can be found at <http://www.energydataweb.com/cpuc/home.aspx>.

These studies will support further progress in HVAC from the savings impacts to understand the savings actually realized in the field and inform future savings

estimates. Studies are also looking at contractor practices and market approaches which affect the ability to capture savings and may lead to more effective program design as well as current rates of compliance with relevant codes and standards.

These studies include:

- Residential and Small Commercial HVAC Impact Evaluation
- Codes and Standards Impact Evaluation (HVAC Compliance Component)
- Phase II HVAC Maintenance Study Behavior Research
- HVAC Programs Process Evaluation and Market Characterization
- Market Effects Study (HVAC Component)

### Other Resources

*California Energy Commission, Strategic Plan to Reduce the Energy Impact of Air Conditioners* (June 2008), <http://www.energy.ca.gov/2008publications/CEC-400-2008-010/CEC-400-2008-010.PDF>

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<sup>3</sup> Upstream incentives have continued from the 2006-2008 program cycle, which allows HVAC distributors and manufacturers to directly encourage the purchase and installation of high-efficiency systems.



## Codes and Standards



### Overview

The codes and standards (C&S) program advances energy efficient technologies and practices from research on emerging technologies, through incentive and information programs, to adoption in California's Building Energy Standards (Title 24) and Appliance Standards (Title 20). Supporting the transition of a new product or practice into a code-appropriate industry standard reduces the overall cost of energy efficiency and spurs additional innovation.

### Estimated Savings

The 2010 – 2012 Statewide C&S program budget is \$30 million, approximately one percent of the total energy efficiency portfolio. By comparison, the C&S program savings are projected to account for about 22 percent of the total portfolio electricity savings

and 25 percent of natural gas savings.<sup>1</sup> C&S savings are only projected and evaluated — there is no ongoing reporting of the progress toward the projected savings, like is shown for the other sectors. Savings from Codes and Standards that are evaluated and deemed attributable to the program intervention (net) count toward the Commission adopted goals for the portfolio, while for other programs the gross savings count toward the goals.<sup>2</sup> The following table presents the energy savings that have been projected for the C&S activities (the projected results will be

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1 These savings are based on a data request to the IOUs for developing The 2010 – 2012 California Statewide Codes and Standards Evaluation Plan developed by The Cadmus Group (subcontractors to DNV KEMA) can be accessed: [http://www.energydataweb.com/cpucFiles/68/20102012CodesandStandardsEvaluationPlan\\_1.pdf](http://www.energydataweb.com/cpucFiles/68/20102012CodesandStandardsEvaluationPlan_1.pdf)

2 Commission Decision D.09-09-047; sections related to Goals and Codes and Standards

updated with evaluation-based estimates of savings in the upcoming year).

**Table 8.** Codes and Standards Sector Savings and Budget Snapshot

	Expenditures	Energy Savings		
	Million \$	kW	kWh	Mtherms
Projected (Gross)	\$30	879,000	5,111,000,000	55.87
Projected (Net)		364	2,178	30.09

Reported Pending Evaluation

## Program Summary

The C&S program<sup>3</sup> engages with code-setting bodies such as the California Energy Commission (CEC) and the US Department of Energy to directly influence the development of codes and standards that strengthen energy efficiency regulations. This activity is largely achieved through conducting research for specific code changes known as Codes and Standards Enhancement (CASE) reports, some of which are used by the CEC to set new standards. The C&S program also improves compliance through education and training initiatives, and it advocates at the local jurisdictions level for the development and implementation of “Reach Codes<sup>4</sup>” that exceed minimum state-

3 Program and subprogram descriptions can be found in the Codes and Standards Program Implementation Plans, 01/03/2011. <http://eega.cpuc.ca.gov/Documents.aspx>

4 Based on Decision 10-10-049; CPUC defines Reach Codes as codes that must be adopted formally by an enforcement jurisdiction. The code must be legally enforceable and enforced

wide code requirements. In addition, the program encourages local building departments to implement best practices for enhancing energy code compliance and enforcement processes.

## Highlights

Initial review of the Codes and Standards programs<sup>5</sup> have revealed that projected savings for the largest portion of the C&S program gas savings will be from the Building Energy Standards (T24). Appliance Standards (T20) projected savings constitute the largest portion of electric savings and demand reduction

by the jurisdiction, and it must apply to all entities within the adopting jurisdiction.

5 The 2010 – 2012 California Statewide Codes and Standards Evaluation Plan developed by Cadmus Group (subcontractors to DNV KEMA) can be accessed: [http://www.energydataweb.com/cpucFiles/68/20102012CodesandStandardsEvaluationPlan\\_1.pdf](http://www.energydataweb.com/cpucFiles/68/20102012CodesandStandardsEvaluationPlan_1.pdf) The Interim Report on Codes and Standards Impact Evaluation by DNV KEMA and the Cadmus Group is expected to be published by August of 2012 at <http://www.energydataweb.com/>

of the total C&S program savings, and a large portion are projected to result from lighting standards. Reach Codes and Federal Standards projected savings that could be attributable to program intervention constitute the smallest portion of the total C&S program savings. Most non-residential construction activity in 2010 – 2012 appears to be alterations of existing buildings rather than new construction.<sup>6</sup> As of April 2012, 64 jurisdictions had received support from the Reach Codes sub-program, of which 33 jurisdictions have CEC-approved reach codes. The Compliance Enhancement/Best Practices sub-program lacks adequate documentation of activities needed to track improvement in compliance after the participating jurisdictions implement the Best Practices procedures included in the program.<sup>7</sup>

## Findings

A process evaluation study was recently completed on the C&S advocacy programs.<sup>8</sup> Some of the key findings from this study include:

- The CEC and CPUC use different factors in determining the cost effectiveness of codes

6 For the two jurisdictions, Davis and Fremont, for which construction permit data was analyzed (for the Title 24 Compliance pilot), only 14% of the projects were new construction projects while 86% were alterations of existing buildings.

7 Architectural Energy Company, the program implementer, is currently working with seven jurisdictions to identify best practices in energy code enforcement including the development and implementation of tools and strategies.

8 2010 – 2012 California Statewide Codes and Standards Program Process Evaluation Final Report, The Cadmus Group, May 2012 [http://www.calmac.org/publications/SCE-PG&E\\_C&S\\_Process\\_Evaluation\\_FINAL\\_5-28-12.pdf](http://www.calmac.org/publications/SCE-PG&E_C&S_Process_Evaluation_FINAL_5-28-12.pdf)

and standards, such as discount rates, measure lives, and savings valuations;

- Differences in schedules of the various CEC and CPUC rulemakings and processes have proven to be a challenge for the C&S Program;
- All the IOUs include training in their program activities; and
- To date, training has only been provided for Title 24, but there is interest in developing trainings for Title 20 with a focus on outreach to manufacturers and distributors (a successful program of this type will require close cooperation between the IOUs and the CEC).

## Recommendations

Given the increasing importance of C&S savings claims to the overall portfolio, CPUC staff should work with the IOUs to develop consistent C&S energy savings reporting guidelines and formats and collaborate with the IOUs and the CEC to address identified differences in cost-effectiveness calculations between the CPUC and the CEC. Other key recommendations from the completed process evaluation include:

- The program should reexamine the allocation of resources between Title 24 and appliance standards activities (Title 20 and federal standards), accounting for Zero Net Energy goals, the CEC's larger resource allocations to Title 24, cost and impacts of federal standards advocacy, and other factors;
- The program should continue portfolio-level planning to assess the best strategy for increasing efficiency of specific measures and products at the portfolio level to both

optimize savings and minimize possible conflict between the C&S Program and other programs;

- IOUs should develop an integrated approach to enhance code compliance between the different C&S sub-programs with clearly defined activities, roles, and objectives;
- The Title 20 Extension of Advocacy should adopt the Title 24 Extension of Advocacy best practices<sup>9</sup>;
- Program staff should work with the CPUC and CEC to align goals, funding, and timing to improve the effectiveness of education and training activities related to improving code compliance.

Several substantive changes to the C&S program design are expected from the CPUC's recent 2013 – 2014 Portfolio Guidance Decision, including:

- Reorienting the program towards an “integrated, dynamic approach” that establishes a formal process that dynamically aligns planning activities across the IOU energy efficiency portfolio with C&S program activities to prepare the market for future code adoption (i.e., improve code readiness), to ensure higher code compliance rates and advance the Strategic Plan's Zero Net Energy goals;
- Expanding C&S program training activities through coordinated initiatives with the WE&T program to provide technical training and certification programs for contractors and technicians, specifically targeting new and advanced technologies that are candidates for

adoption into future Reach Codes, Building Codes and Appliance Standards; and

- Collaborating closely with the CEC in support of the CEC's marketing, outreach and education activities to improve C&S compliance.

The CEC and CPUC, in coordination with the IOUs, are currently drafting a statewide C&S Action Plan that will serve as a roadmap to guide the implementation of key Strategic Plan initiatives in the 2012-2015 timeline. The plan will soon be vetted in a public process to seek input from key market actors and stakeholders. The plan is targeted for public release by Q3 2012.

### For More Information

Findings from initial evaluation results included in this chapter may be found at [www.calmac.org](http://www.calmac.org) and [www.energydataweb.com](http://www.energydataweb.com). These studies are listed below:

#### Completed Studies:

2010 – 2012 California Statewide Codes and Standards Program Process Evaluation Final Report, The Cadmus Group, May 2012

[http://www.calmac.org/publications/SCE-PG&E\\_C&S\\_Process\\_Evaluation\\_FINAL\\_5-28-12.pdf](http://www.calmac.org/publications/SCE-PG&E_C&S_Process_Evaluation_FINAL_5-28-12.pdf)

#### Pending Studies:

- A statewide impact evaluation study is currently underway to verify the projected energy savings from (2010 – 2012) C&S program and evaluate the effectiveness of the Compliance Enhancement and Reach Codes sub-programs.
- The 2010 – 2012 C&S Program Evaluation Plan (expected June 2013)  
<http://www.energydataweb.com/cpucFiles/68/>

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<sup>9</sup> Extension of Advocacy refers primarily to training activities to improve compliance

[20102012CodesandStandardsEvaluationPlan\\_I.pdf](#)

- The Interim Report on Codes and Standards Impact Evaluation by DNV KEMA and the Cadmus Group (expected August of 2012)
- <http://www.energydataweb.com/>

**Other Resources:**

Additionally, a list of Local Jurisdictions adopting reach codes can be accessed at:

<http://www.energy.ca.gov/title24/2008standards/ordinances/>



# Integrated Demand Side Management



## Overview

Integrated Demand Side Management (IDSM) is one of the new initiatives in the 2010 – 2012 energy efficiency cycle. Historically, demand-side programs have been “siloes,” focusing on individual products (such as a single efficient air conditioner) rather than integrated program offerings that maximize energy savings and minimize program costs. The IDSM program was developed to change this orientation across all demand side programs by identifying opportunities to improve customers’ energy management through a suite of energy efficiency, demand response (reducing demand at critical times or in response to electricity prices) and on-site customer electric generation offerings (including programs that are enabled by smart meters). While still early in its development, the IDSM program may ultimately be an important tool in ensuring California’s ability to meet energy needs

while reducing per capita energy use and moving towards zero net energy (ZNE) buildings.<sup>1</sup>

The IDSM program is classified as a non-resource program in the 2010 – 12 program cycle, which means it is not required to report energy savings. The budget for IDSM is about one percent of the total portfolio budget for 2010 – 2012. Approximately one-third of the IDSM budget was spent through 2011. Much of the funding for IDSM activities occur through other statewide programs such as Zero Net Energy, core market sector programs (e.g. commercial, residential), and pilot programs.

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<sup>1</sup> See California’s “Energy Action Plan” at <http://www.cpuc.ca.gov/PUC/energy/resources/Energy+Action+Plan/> and California’s Energy Efficiency Strategic Plan at <http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/eesp/>

**Table 9.** IDSM Sector Expenditures

Expenditures	
Million \$	
Projected	\$24
Reported	\$7.5
% of Projected	31%

## IDSMS Programs

The statewide IDSM program for 2010 – 2012 includes 14 pilot programs, as described in the utilities’ quarterly reports. Integrated demand side management pilots, including PG&E’s Green Communities program, SCE’s and Sempra’s Sustainable Communities program, and SDG&E’s Micro Grid Pilot, feature integrated demand-side marketing, administration, funding and customer incentives, training, delivery and evaluation to facilitate a more streamlined program delivery. This integrated approach was designed to achieve the greatest possible energy savings throughout the portfolio, while minimizing redundancies and missed opportunities. Additionally, to address specific barriers to effective implementation of IDSM programs, the IOUs have been directed to develop a method to measure cost-effectiveness of integrated projects and pilots, measurement and evaluation protocols for IDSM projects and programs, standardized integrated audit tools and an IDSM working group over the course of the 2010 – 2012 cycle.

## Highlights

The CPUC’s Energy Division and the IOUs (PG&E most extensively) have internally reorganized to help promote and support delivery of integrated demand-side strategies by having staff and internal responsibilities cross program implementation and oversight for energy efficiency, demand response and distributed generation. As a result, personnel are now more aware of the objective to provide integrated solutions to customers, which improves customer integration. Additionally, the IOUs have improved the integration of the project applications and reimbursement process for some projects, which is intended to create a more concise and streamlined process for customers. Finally, the IOUs have developed a unified project inspection process, which is also intended to eliminate unnecessary redundancies and streamline the inspection process.

## Findings

Key findings have been derived from Energy Division and evaluation staff interactions with the IDSM Task Force, review of the task force’s quarterly reports, preliminary findings from evaluation research, and DSM awareness questions in the Commercial Saturation Survey. Several challenges were identified as the IDSM approach moves into the next program cycle:

- The IDSM pilots were not designed with integration as their primary focus (Commission direction calls for improved IDSM design for pilots in 2013 – 2014);<sup>2</sup>

<sup>2</sup> See Energy Division’s Omnibus IDSM Process Evaluation Early Feedback Memo, February 2012; and D.12-05-015 at [http://docs.cpuc.ca.gov/WORD\\_PDF/FINAL\\_DECISION/166830.PDF](http://docs.cpuc.ca.gov/WORD_PDF/FINAL_DECISION/166830.PDF)

- Funding and regulatory silos across DSM strategies appear to make integration more challenging, resulting in barriers to IDSM program design and implementation;
- A cost-effectiveness methodology that supports effective program evaluation, design and implementation needs to be developed and adopted;
- A consistent and widely accepted definition of IDSM within the IOUs is needed — marketing appears to largely focus on efficiency and demand response, but needs consistent approach for DG content;
- Progress toward integration is limited by the abilities of the current tracking systems — a unified and consistent integrated tracking database that includes rebated EE, audit, DR, DG, and web-based smart grid programs is needed; and
- The preliminary findings from the Commercial Saturation Survey indicates that large companies are receiving more information on DR than medium and small companies, while medium and small companies know more than their large counterparts with regards to distributed generation.<sup>3</sup>
- Expand breadth of participation in the IDSM Task Force to include representatives from beyond the utilities and CPUC;
- Improve data tracking and collection for integrated programs and projects;
- Develop and implement a consistent integrated marketing plan that incorporates EE, DR, DG, and SmartMeter-enabled programs;
- Restructure current IDSM pilot programs to increase support for IDSM goals and objectives to further promote integration;
- Research why DG is not being promoted through IDSM activities, and seek to close the “DG gap” in IDSM (including understanding DG potential);
- Develop an integrated cost-effectiveness methodology to support IDSM based on a common “core” of avoided cost inputs and methods combined with resource-specific variations, as appropriate and taking into account interactive effects between EE, DR and DG; and
- Seek to synchronize CPUC proceedings for DR, EE, DG so they begin and end around the same time to deal with integrated components consistently and simultaneously.

## Recommendations

Based on early evaluation findings, the following recommendations to improve program implementation were developed based on input from the IDSM task force:

<sup>3</sup> [(Itron, Preliminary Memorandum: Attitude and Awareness of DSM and IDSM in the Commercial Population, May, 2012)

## For More Information

Findings from initial evaluation results included in this chapter may be found at [www.calmac.org](http://www.calmac.org) and [www.energydataweb.com](http://www.energydataweb.com). These studies are listed below:

### Completed Studies:

- Omnibus IDSM Process Evaluation, Early Feedback Memo, Itron, February 2012 [not yet posted]

- Itron, *Preliminary Memorandum: Attitude and Awareness of DSM and IDSMD in the Commercial Population*, May, 2012)  
[Not yet posted]

**Pending Studies:**

An Omnibus IDSMD Process Evaluation is underway that is examining IDSMD achievements and setbacks experienced to date. Findings from this study will be released on an ongoing basis. The study plan is available now, and preliminary results are expected by the end of August 2012.

Omnibus IDSMD Process Evaluation, Itron, (pending full report end of 2013) <http://www.energydataweb.com/cpucFiles/topics/101/Omnibus%20IDSMD%20Program%20Process%20Evaluation.docx>

## Workforce Education and Training



### Overview

Workforce education and training plays a key role in achieving California's ambitious energy efficiency goals. As noted in the Strategic Plan, "in order to accommodate the dramatic increase in energy efficiency activities envisioned by this Plan and required by AB 32, California must develop a trained workforce, including people qualified in energy-efficiency engineering, construction, maintenance, program design and implementation, and financial analysis."<sup>1</sup> The CPUC and the IOUs have taken steps to strengthen existing and, where needed, promote new coordinated workforce training efforts specific to energy-related sectors. With the strong emphasis in recent years on establishing the right labor force for the "new economy," the 2010 – 2012 program cycle

marked the first time that the CPUC provided guidance to the IOUs regarding workforce, education, and training (WE&T) activities.

The statewide WE&T program is currently considered a "non-resource program" and, therefore, energy savings for this particular program are not reported. The budget for WE&T activities for 2010 – 2012 was \$89.8 million and through 2011, the IOUs have spent \$49 million, or approximately half of their budget. The WE&T activities make up approximately three percent of the portfolio budget.

<sup>1</sup> CPUC, 2008, p. 70

**Table 10.** WE&T Sector Budget

Expenditures	
Million \$	
Projected	\$89.8
Reported	\$49.1
% of Projected	55%

WE&T must meet program performance metrics to gauge its success. One metric being tracked for the program is the number of participating schools that have significant low income populations. As of the 2011 annual reports on program performance metrics,<sup>2</sup> the K-12 Connections program, which promotes career awareness, had 1,837 participating schools – 57% of them were Title I schools<sup>3</sup> – and is on track to meet its goals in this program cycle. In addition, IOU energy centers have hosted training for over 500 Californians in multiple aspects of demand side energy services from 2009-2011.<sup>4</sup> Other program performance metrics will be reported at the end of the program cycle.

2 Joint IOU Program Performance Metrics Report for Program Year 2011 Submitted May 1, 2012; page 5

3 Title I schools are defined as schools in which at least 40% of the students are enrolled in the Free and Reduced Lunch Program.

4 Workforce Education & Training Phase 2 Process Evaluation: Centergies, Opinion Dynamics Corporation, June 2012. Early Findings Briefing.

## Workforce Education and Training Programs

The IOU WE&T efforts seek to build workforce readiness through sector strategy partnerships and education, and three specific programs. First, the Centergies Program is organized around technology categories (i.e. advanced lighting and HVAC) and facilitates education and training in energy efficiency, IDSM and resource management. Second, the Connections Program focuses on building relationships and promoting coordinated energy-related careers and training activities with external educational organizations from K – 12 schools to adult education institutions. Lastly, the Strategic Planning program utilizes a statewide task force (including IOUs and external stakeholders) to address broader WE&T implementation and partnership strategies.

### Highlights

In Connections, the K-12 targets for low income outreach are being met and the program is on track to meet its goals for the portfolio cycle.<sup>5</sup> Through the IOUs' Centergies program and other activities training has reached plumbers, lighting contractors, HVAC installers and other key labor specialties. The California Advanced Lighting Controls Training Program (CALCTP), which is focused on increasing the installation and use of advanced lighting controls, is training and certifying electricians in the proper design, installation and commissioning of advanced lighting control systems. This program has been

5 See Resolution E-4385, which established program performance metrics (PPMs) for statewide energy efficiency programs, at [http://docs.cpuc.ca.gov/word\\_pdf/FINAL\\_RESOLUTION/127632.pdf](http://docs.cpuc.ca.gov/word_pdf/FINAL_RESOLUTION/127632.pdf)

heralded as one of the most successful training and certification efforts in the 2010- 2012 cycle, and it is being used as a model for the IOUs to develop similar sector strategy approaches in the 2013 – 2014 cycle.

## Findings

Several WE&T studies are underway, but none have been completed. The most recently completed relevant research is a WE&T needs assessment developed in March 2011. Key findings from that assessment include:<sup>6</sup>

- The hardest hit sector in California in the economic downturn has been in the construction trades, a core industry for supporting energy efficiency, seeing an almost 44% decline in jobs since 2006 ;
- The residential energy efficiency workforce includes a higher concentration of poor quality installations due to lack of clear training and installation standards which results in low paying jobs;
- Existing ratepayer dollars must be leveraged through more training partnerships with the private sector, K-12 schools, and advanced educational institutions to create the workforce; and
- Linkages between market demand, workforce training, and job placement need to be strengthened in order to achieve the goals of the Strategic Plan.

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6 California Workforce Education and Training Needs Assessment for Energy Efficiency, Distributed Generation, and Demand Response, Donald Vial Center on Employment in the Green Economy, UC Berkeley, March 2011, p. 9.

## Recommendations

As previously noted, evaluation results are not yet available for 2010 – 2012 WE&T programs. The 2011 needs assessment, authored by U.C. Berkeley's Don Vial Center on Employment in the Green Economy, calls for more stringent contractor licensing, increased training, and a focus on stable firms. Specific recommendations, currently under consideration or supported by the Commission, include:<sup>7</sup>

- Strengthen and expand collaborations with career academies, regional occupational programs and community colleges through a sector strategy approach (known as "sector strategies");<sup>8</sup>
- Include participation of low-income participants in WE&T opportunities throughout all educational levels and coordinate with the Energy Savings Assistance Program (ESAP);
- Support and expand career awareness and exploration in K – 12 programs;
- Expand contractor/contractor association collaborations to trade associations that have demonstrated a commitment to investments in ongoing workforce training, such as contributions to apprenticeship programs;
- Modify course offerings to focus on a specific occupation, have a workplace-based hands-on

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7 California Workforce Education and Training Needs Assessment for Energy Efficiency, Distributed Generation, and Demand Response, Donald Vial Center on Employment in the Green Economy, UC Berkeley, March 2011, p. 204.

8 Sector Strategies are state policies that promote regional partnerships of employers, educators, workforce developers and other stakeholders that address the skills needs of critical industries in a region; <http://www.sectorstrategies.org>.

component, clear learning objectives, and lead towards a certification;

- Actively support curriculum review and updating, instructor professional development, and continuing education requirements associated with license renewal for the main institutional providers.
- Strengthen tracking of participants and outcomes to better understand program effects, especially with regard to low-income and minority communities; and
- Promote clear standards and skill certifications to help increase energy efficiency savings.

## For More Information

Findings from initial evaluation results included in this chapter and studies related to work force education and training may be found at [www.calmac.org](http://www.calmac.org) and [www.energydataweb.com](http://www.energydataweb.com). These studies are listed below:

### Completed Studies:

California Workforce Education and Training Needs Assessment for Energy Efficiency, Distributed

Generation, and Demand Response, Donald Vial Center on Employment in the Green Economy, UC Berkeley, March 2011.

<http://www.irle.berkeley.edu/vial/>

### Pending Studies:

The *Statewide Workforce Education and Training Process Evaluations* will assess the alignment of the WE&T programs with Strategic Plan / Needs Assessment and implementation effectiveness. Early evaluation findings from this work are expected to inform development of WE&T activities for the 2013 – 2014 period.

Workforce Education & Training Process Evaluation: Connections, Early Findings, Opinion Dynamics Corporation, June 2012

Workforce Education & Training Process Evaluation: Centergies, Early Findings, Opinion Dynamics Corporation, June 2012 <http://www.energydataweb.com/cpuc/home.aspx> (search Workforce Education and Training)

## Marketing Education and Outreach



### Overview

Integrated, effective marketing, education and outreach (ME&O) is essential for wide-scale adoption of energy efficiency products and practices. A vision for Californians “engaged as partners in the state’s energy efficiency, demand-side management and clean energy effort” led to the launch of Engage360.com as part of the 2010 – 2012 portfolio.<sup>1</sup> Engage 360 was intended to coordinate statewide efficiency efforts under one umbrella brand, integrating messaging and access points for target audiences. In October 2011, the CPUC discontinued funding of the Engage 360 brand and ended the program, finding

that the brand was confusing and had failed to gain traction.<sup>2</sup> Statewide ME&O-related evaluations were also discontinued, and as a result, specific findings for that program are not available for this report. In May 2012, the Commission voted to broaden Energy Upgrade California ([www.energyupgradeca.org](http://www.energyupgradeca.org)) to become the statewide “one-stop shop” for whole building upgrades, demand response, distributed generation, and low income programs.<sup>3</sup> Some related findings from evaluations of the whole-house (Energy Upgrade California) program may be useful for the new statewide ME&O effort.

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1 See California Long-term Energy Efficiency Strategic Plan, CPUC, Sept. 2008, p. 75, at <http://www.cpuc.ca.gov/NR/rdonlyres/D4321448-208C-48F9-9F62-1BBB14A8D717/0/EEStrategicPlan.pdf>

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2 See Assigned Commissioner Ruling Regarding Statewide Marketing and Outreach Program, October 13, 2011, at <http://docs.cpuc.ca.gov/efile/RULINGS/145410.pdf>

3 See Commission Decision D.12-05-015 at [http://docs.cpuc.ca.gov/word\\_pdf/FINAL\\_DECISION/166830.pdf](http://docs.cpuc.ca.gov/word_pdf/FINAL_DECISION/166830.pdf)

The statewide ME&O program is currently considered a “non-resource program,” so energy savings for this program are not reported. The 2010 – 2012 budget for ME&O activities was \$61 million, but only \$9 million (approximately 15 percent of the allocated budget) had been spent through 2011 due to the program re-direction. The ME&O activities were budgeted at two percent of the portfolio budget, and to date represent one percent of total expenditures.

**Table II.** ME&O Sector Budget

<b>Expenditures</b>	
<b>Million \$</b>	
<b>Projected</b>	\$61.8
<b>Reported</b>	\$9.8
<b>% of Projected</b>	55%

## Marketing Education and Outreach Programs

There were two types of ME&O programs planned for the 2010 – 2012 portfolio: (1) IOU “local” marketing targeting IOU-specific regional audiences and (2) Statewide programs with universal messaging across California. Under the IOU-specific approach, each program has a marketing budget that is either administered as part of each individual program, or in the case of SCE, through an integrated marketing and outreach effort. This will continue as a way to target local or regional audiences. In addition, “Energy Upgrade California” (EUC), which the California

Energy Commission and Energy Division staff developed in 2011 with federal stimulus program and ratepayer dollars, has promoted whole building retrofits as a pathway to energy reduction. As noted in the overview, the CPUC has directed expansion of EUC into the statewide brand for efficiency programs.<sup>4</sup>

## Highlights

There are four encouraging trends in the state’s ME&O programs:

- Face-to-face marketing efforts have proven highly effective for EUC – while advertising has resulted in high awareness of EUC statewide, ratepayers who learn about the program by word of mouth, from promoters at events, or from contractors are twice as likely to sign up for the program than those only exposed to advertising;<sup>5</sup>
- The most effective messages for EUC program participants are focused on comfort, incentives and lowering energy bills;<sup>6</sup>
- In the current cycle, IOUs have begun to take an integrated approach to their marketing materials, including energy efficiency, demand response, and on-site generation (this “whole building” approach is also what drives messaging in Energy Upgrade California); and
- IOUs have engaged in segmented marketing to their own ratepayers, producing more

<sup>4</sup> R.09-11-014 at P. 289

<sup>5</sup> “Findings and Recommendation from the Whole House Process Evaluation – Training and Marketing,” prepared by SBW Consulting, ASW Engineering and Opinion Dynamics Corporation, June 12, 2012.

<sup>6</sup> Ibid.

materials targeting homeowners, business owners, low income residents, industrial customers, and other segments.<sup>7</sup>

## Findings

The statewide ME&O program activities for the 2010 – 2012 program cycle were suspended by an Assigned Commissioner Ruling (ACR) in October 2011. Consequently, planned program evaluation was not implemented and results are unavailable.

## Recommendations

While the 2010 – 2012 statewide ME&O activities were not completed or evaluated, the following recommendations have been identified in recent CPUC guidance to the utilities, past seminal studies and Energy Division experience:

- The most important objective for all of the ME&O activities for demand-side programs in general is that they be coordinated;<sup>8</sup>
- While mass media efforts should continue as a way to raise awareness, they need to be complemented with a greater emphasis on highly localized, specific initiatives that will educate households and move them to action;<sup>9</sup>

7 These are based on presentations given by the IOU's to the CPUC's Energy Division staff on May 2, 2012

8 Ibid.

9 Opinion Dynamics Corp. PY2006 – 2008 Indirect Impact Evaluation of the Statewide Marketing and Outreach Programs. Study ID: CPU0027.01. February 24, 2010, [http://calmac.org/publications/CPUC\\_SWMO\\_Integrated\\_Indirect\\_Impact\\_Report\\_Voll\\_022410.pdf](http://calmac.org/publications/CPUC_SWMO_Integrated_Indirect_Impact_Report_Voll_022410.pdf)

- In-person and peer-to-peer marketing, as well as support marketing through local contractors, should be used to promote EUC;<sup>10</sup>
- Best available behavior change studies should be used to inform program marketing for long-term change, including aiming for activities beyond “triggers” to internalize motivations and drive personal responsibility;<sup>11</sup> and
- New methods of studying ME&O efforts on an IOU-by-IOU basis – including tracking budgets, marketing channels, and audience segments – could provide information to improve overall effectiveness of the portfolio and would assist the CPUC in its program evaluation efforts.

## For More Information

Findings from evaluation results included in this chapter and studies related to marketing education and outreach may be found at [www.calmac.org](http://www.calmac.org) and [www.energydataweb.com](http://www.energydataweb.com). These studies are listed below:

### Completed Studies:

A process evaluation of the Energy Upgrade California provides insights on successful marketing strategies for that program

- “Findings and Recommendation from the Whole House Process Evaluation – Training and Marketing,” prepared by SBW Consulting, ASW Engineering and Opinion Dynamics

10 Recommended in “Findings and Recommendation from the Whole House Process Evaluation – Training and Marketing,” prepared by SBW Consulting, ASW Engineering and Opinion Dynamics Corporation, June 12, 2012.

11 From WO 1009 – AKA-B

Corporation, May, 2012, <http://www.energy-dataweb.com/cpuc/search.aspx>.

The Flex Your Power brand assessment, which measured brand equity and the potential of Flex Your Power to meet new marketing and savings goals set forth in the California Energy Efficiency Strategic Plan (CEESP) and D. 09-09-047

- Brand Assessment Report – Summary of Findings and Recommendations, Interbrand, November 2009, [http://www.cpuc.ca.gov/NR/rdonlyres/93CB5008-7AED-4BB3-A940-138B84824FA9/0/SWMO\\_Brand\\_Assessment\\_Report.pdf](http://www.cpuc.ca.gov/NR/rdonlyres/93CB5008-7AED-4BB3-A940-138B84824FA9/0/SWMO_Brand_Assessment_Report.pdf).

ME&O evaluation results for the 2006-2008 program cycle may be found on the searchable California Measurement Advisory Council website (<http://www.calmac.org/search.asp>)

- Opinion Dynamics Corp. PY2006 – 2008 Indirect Impact Evaluation of the Statewide Marketing and Outreach Programs. Study ID: CPU0027.01. February 24, 2010  
[http://www.calmac.org/publications/CPUC\\_SWMO\\_Integrated\\_Indirect\\_Impact\\_Report\\_Voll\\_022410.pdf](http://www.calmac.org/publications/CPUC_SWMO_Integrated_Indirect_Impact_Report_Voll_022410.pdf)

#### **Other Resources:**

The California Public Utilities Commission website ([www.cpuc.ca.gov](http://www.cpuc.ca.gov)) includes updated information on ME&O efforts.

## Emerging Technologies



### Overview

The Emerging Technologies Program (ETP) is designed to support market demand for and supply of new energy efficient technologies. Driving demand and supply is accomplished by contributing to the development and deployment of new and under-utilized products, practices, and tools, and by introducing them into energy efficiency programs or the broader market. As evidenced by the near doubling of the 2010 – 2012 ETP budget (\$56 million) over the previous cycle (\$30 million) and an increase in the number of program elements from one to six, the CPUC considers ETP to be of increasing importance as the state works towards the Strategic Plan's zero net energy (ZNE) goals.

The ETP is classified as a non-resource program in the 2010 – 2012 program cycle, which means it is not reporting energy savings. The 2010-12 ETP budget is \$56 million, about two percent of the total portfolio budget, and a majority of the funds are being used for technology assessments.<sup>1</sup> As of 2011, the ETP expenditures were about one percent of total portfolio expenditures.

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<sup>1</sup> Source: IOUs 2010 – 2012 Energy Efficiency Portfolio Program Implementation Plan, Statewide Emerging Technologies Program (March/2009, revised January/2011)

**Table 12.** Emerging Technologies Sector Budget

Expenditures	
Million \$	
Projected	\$55.8
Reported	\$17.9
% of Projected	32%

also works to increase technology supply by bridging research and development, including the development of networking opportunities and training for entrepreneurs. Finally, ETP supports ZNE by advancing innovative measures or strategies and supporting ZNE-specific research.

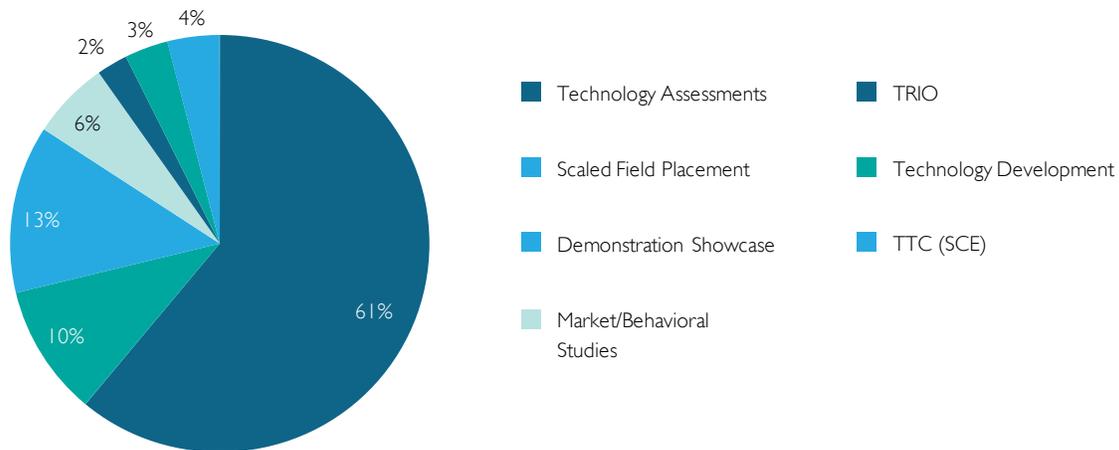
### Highlights

An ETP Process Evaluation and Market Assessment is currently underway, and interim results are anticipated in the fall of 2012. Additionally, a database created to enable tracking of program projects and activities reported by the utilities on a quarterly basis is being revised to reflect changes in program design and provide information necessary to track program performance metrics related to ETP, such as the number and types of technologies transferred from ETP into the energy efficiency portfolio.

### Program Summary

ETP’s implementation approach consists of assessing technologies to be included in future energy efficiency portfolios, increasing visibility of new technologies (e.g., new building controls or LED lights) and conducting research into customer decision-making and market behavior. The program

**Figure 3.** ETP Budget Breakdown



## Recommendations

While program evaluation recommendations are still being developed for the 2010 – 2012 cycle, the Commission recommended several substantive program changes in its recent 2013 – 2014 Portfolio Guidance Decision, including:

- Expediting the development and adoption of advanced technologies by proposing a detailed plan (including program targets, activities and budgets) that addresses key market sectors and end-uses;
- Expanding collaborative efforts to include CEC and IOU C&S activities to support the transition of emerging technologies and approaches into future codes;
- Focusing some program efforts on reducing plug loads and advanced integrated building design and operation solutions to achieve ZNE goals;
- Expanding ETCC membership to include representatives from key research organizations and universities, as well as the CEC and Department of Energy; and
- Developing residential and commercial technology roadmaps that encompass existing building retrofits and new construction to be implemented in 2015 and beyond.

## For More Information

Findings from studies related to emerging technologies may be found at [www.calmac.org](http://www.calmac.org) and [www.energydataweb.com](http://www.energydataweb.com). Several studies are in pending to assess the 2010 – 2012 ETP efforts:

## Pending Studies:

The ETP Process Evaluation and Market Assessment is underway. Phase one is assessing the program design and implementation. Phase two, targeted to begin in October of 2012, will assess whether ETP achieved its goals. An interim evaluation report summarizing main findings and recommendations is anticipated to be released by early July 2012.

- ETP Process Evaluation and Market Assessment Evaluation Plan [http://www.energydataweb.com/cpucFiles/pdaDocs/749/PY2010 – 2012%20ETP%20Evaluation%20Plan\\_Final\\_2011\\_09\\_2.pdf](http://www.energydataweb.com/cpucFiles/pdaDocs/749/PY2010-2012%20ETP%20Evaluation%20Plan_Final_2011_09_2.pdf).

In addition, the CEC (PIER office) and the CPUC (Energy Division) in coordination with the key research organizations, market actors and stakeholders are developing a statewide *Research and Technology Action Plan* to address Strategic Plan goals. The plan will guide the implementation of key initiatives in 2012-2015 timeline for the RD&D community. The action plan has included a public participation and input process and is targeted for public release by July 2012.



## Local Government



### Overview

Local Government Programs consist of partnerships between local governments and the IOUs to achieve tangible energy efficiency gains within public facilities and at hard-to-reach targets such as local independent commercial enterprises. These IOU-administered programs, in concert with energy saving activities launched by local governments on their own initiative, support both the near- and long-term portfolio savings objectives, as well as advancing the Strategic Plan's local governments element. Local government partnerships are on track to meet their energy savings targets based on reported savings and are making progress on many of their strategic performance metrics.

### Estimated Savings

Local Government Programs represent about eight percent of the 2010 – 2012 portfolio budget and four percent of the expected energy and demand impacts for the portfolio, as not all partnership programs or activities result in direct energy savings.<sup>1</sup> For those programs that have reported savings, by end of 2011 they have met over half of their energy savings targets. The savings reported in this sector are attributable to activities that promote government building retrofits and local participation in IOU-administered programs, including retrofits of small commercial buildings and middle income residences.

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<sup>1</sup> This estimate does not include institutional partnerships; and SDG&E and SoCalGas report savings from Local Government Partnerships in the commercial sector programs that perform government building retrofits.

## Local Government | 2010 – 2011 Energy Efficiency Evaluation Report

These impacts are an important contribution towards meeting the portfolio energy savings goals, but they represent just one component of the local government initiatives.

**Table 13.** Local Government Sector Savings and Budget Snapshot

	Expenditures	Energy Savings			CO <sub>2</sub>	Average Program Cost effectiveness
		Million \$	kW	kWh		therms
Projected	\$238	57,650	336,198,398	(843,839)		
Reported	\$118	38,882	214,853,169	163,768	122,221	1.11
% of Projected	50%	67.4%	63.9%	-19.4%		

*\*Institutional partnerships are not included but reported as part of the commercial impacts.*

## Local Government Programs Summary

More than 40 cities,<sup>2</sup> counties, and regional governments work as “partners” under contract with the IOUs to deliver energy efficiency programs and services, some of them in coordination with multiple neighboring cities. Generally, all local government partnerships work on three broad program areas with variations by utility and the specific partnership agreement:

- Improving efficiency of government buildings through retrofits, retro-commissioning, integrated demand response, technical assistance

<sup>2</sup> A list of the specific cities and counties are identified in the program list in Appendix C.

or facilitating on-bill financing with varied degrees of emphasis;<sup>3</sup>

- Strategic Plan support including development of reach codes, improving code compliance, guiding document support, financing for the community, and peer to peer support;<sup>4</sup> and

<sup>3</sup> These objectives were identified in PG&E’s master program implementation plan. In practice Integrated DR is not a prominent activity but through some audit activity at SCE. The IOUs provide technical assistance to the LGPs for building retrofits but technical assistance is not a service, deliverable or contract goal of the LGP contracts.

LGPs do not offer OBF in the CPUC/IOU portfolio but leverage it through the IOUs. Some LGs have offered financing, through ARRA funds and the guidance decision recommended continuing successful LGP finance efforts funded under ARRA.

<sup>4</sup> The main focus is climate action plans as – most every partnership is working on them while many fewer are working

- Promotion of IOU energy efficiency programs by providing local marketing, direct installations for residential and small businesses, and retrofits for moderate income populations.

## Highlights

A 2011 annual report prepared for the CPUC<sup>5</sup> tracks progress of all 540 cities and counties statewide on strategic indicators, such as/including progress on adopting reach codes, code compliance, and other efforts. Many of these efforts occur outside of the IOU-government contracts but support the ability for local governments to advance energy efficiency in the state. Report highlights include:

- By early 2012, 42 cities and counties had local reach codes—mostly for green building—approved by the CEC that exceeded Title 24 minimum standards;<sup>6</sup>
- Given the high levels of code non-compliance<sup>7</sup> a handful of partners are holding Title 24 trainings and working to improve compliance

(see Codes and Standards chapter for more information)<sup>8</sup>

- At least 136 local governments have a climate action plan to reduce GHG emissions on a set schedule, and energy efficiency funds from IOUs support the building energy efficiency portions of the plans;<sup>9</sup>
- At least 10 local agencies have created revolving energy funds to support energy efficiency projects, with initial funding from the IOUs that is then replenished with incentive payments from energy projects and the energy cost savings;<sup>10</sup>
- A total of 77 cities and counties have general plans with energy elements (but not all address energy efficiency); and
- A total of 144 local governments and cities partnering with SCE also have developed Energy Action Plans which encourage or require public building energy performance that is higher than state law.

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on codes.

5 Second Annual Report from Statewide Local Government Energy Efficiency Best Practices Coordinator, March 2012; <http://eecoordinator.info/coordinator-reports/>.

6 Second Annual Report from Statewide Local Government Energy Efficiency Best Practices Coordinator, March 2012; pg. 4

7 For example, a 2011 CEC draft report [*Achieving Energy Savings in California Buildings: Saving Energy in Existing Buildings and Achieving a Zero-Net-Energy Future* (CEC-400-2011-007-SD)] estimated at least 30 percent of the energy savings potential of the EE building standards is lost to noncompliance, including failures to install HVAC systems and seal air ducts properly.

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8 Second Annual Report from Statewide Local Government Energy Efficiency Best Practices Coordinator, March 2012; pg. 7.

9 Program Assessment (LGP memo – Navigant) pending June 2012.

10 Second Annual Report from Statewide Local Government Energy Efficiency Best Practices Coordinator, March 2012; – page 9

## Findings

A *Program Assessment of Local Government Partnerships*<sup>11</sup> study that reviews multiple programs in the Local Government segment of the portfolio is underway. Early feedback from this study shows that deep budget cuts and layoffs are a critical barrier to local government partners addressing energy efficiency, which some consider a “luxury.” This study will be completed in July 2012 and will add to the understanding of success parameters and best practices for local partnership programs.

## Recommendations

In its 2013 – 2014 Portfolio Guidance Decision, the CPUC invited local governments to work in concert to create Regional Energy Networks (RENs) that would expand opportunities for local governments to promote and support energy efficiency. The RENs would act as program administrators and develop regional efficiency programs that:

- Leverage additional state and federal resources so that energy efficiency programs are offered at lower costs to ratepayers;
- Address the water/energy nexus;
- Develop and deploy new and existing technologies;
- Address workforce training issues; and
- Address hard-to-reach customer segments such as low to moderate residential households and small to medium sized businesses.

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<sup>11</sup> Local Governments Programs Program Assessment Memo, expected July 2012. It specifically referred to strategic plan work like reach codes, climate action plans, etc.

## For More Information

Findings from studies related to local government partnerships may be found at [www.calmac.org](http://www.calmac.org) and [www.energydataweb.com](http://www.energydataweb.com). Several studies and reports are available and pending which are listed here:

### Completed Studies:

- *Second Annual Report from Statewide Local Government Energy Efficiency Best Practices Coordinator*, Patrick Stoner, March 2012
- <http://eecoordinator.info/coordinator-reports/>

### Pending Studies:

A program best practice assessment will be completed in July 2012, which will further illuminate the challenges and successes faced by IOUs and local government partnerships.

- Nonresidential Program Assessments Study, Local Government Partnerships, Navigant, July 2012  
[Not yet posted]

# Lighting



## Overview

Lighting represents approximately one quarter of residential and commercial electricity use in California and has historically represented half or more of utility program portfolio savings.<sup>1, 2</sup> California's Strategic Plan cites energy efficient lighting as a critical element of the Strategic Plan's zero net energy vision, and sets a goal of a 60 to 80 percent reduction in California's electric lighting energy consumption by 2020 (over

<sup>1</sup> California Energy Commission. California Energy Demand 2003-2013 Forecast: Staff Report. Prepared in Support of the Electricity and Natural Gas Report under the Integrated Energy Policy Report Proceeding (02-IEP-01). August 2003.

<sup>2</sup> In the 2006-2008 program cycle, 58 percent of the evaluated electric savings came from indoor lighting. California Public Utilities Commission, 2010. 2006-2008 Energy Efficiency Evaluation Report. July, 2010; page iii.

a 2010 baseline).<sup>3</sup> California Assembly Bill 1109 (the California Lighting Efficiency and Toxics Reduction Act, also known as "the Huffman Bill") will support this goal by phasing out some traditional, low efficiency incandescent lamps by 2018, but additional program support is necessary. For this reason, and because of "rapid progress toward lighting market transformation," the CPUC has directed the IOUs to shift energy efficiency program support away from basic spiral compact fluorescent lamps (CFLs) and toward more efficient lamps (e.g., specialty CFLs such as A-lamps, globes, and reflectors) and other advanced lighting technologies (e.g., light-emitting diode – LEDs).<sup>4</sup>

<sup>3</sup> California Public Utilities Commission, 2008. California Long Term Energy Efficiency Strategic Plan. September, 2008.

<sup>4</sup> California Public Utilities Commission, 2009. D.09-09-047: Decision Approving 2010 to 2012 Energy Efficiency Portfolios

## Estimated Savings

After two years, nine lighting specific programs have nearly reached their electric and demand savings targets. The lighting programs were budgeted at about 6 percent of the portfolio. Savings from these lighting-specific programs represent almost 33 percent of the claimed electricity savings through 2011, and 27 percent of the peak load impacts. Based on expen-

across all sectors, Approximately 28 percent of the savings comes from residential lighting and about 32 percent of the portfolio savings are derived from non-residential lighting, illustrating the continued importance of lighting across the portfolios.

## Program Summary

Numerous programs in the IOUs' 2010 – 2012

**Table 14.** Lighting Sector Savings and Budget Snapshot

	Expenditures	Energy Savings			CO <sub>2</sub>	Average Program Cost effectiveness
	Million \$	kW	kWh	therms	Tons	TRC
<b>Projected</b>	\$179	299,630	2,007,457,196	(13,149,590)		
<b>Reported</b>	\$113	285,448	1,908,148,834	(35,162,806)	860,602	5.20
<b>% of Projected</b>	63%	95.3%	95.1%	267.4%		

ditures to date lighting programs have spent about sixty percent of their projected budget to achieve these savings. Two subprograms within the residential sector — the Basic CFL Subprogram (which includes only basic CFLs) and the Advanced Lighting subprogram (which includes all other lighting technologies) — comprise the majority of savings among these programs.

However, across all three electric IOU portfolios for the 2010 through 2012 programs, lighting measures account for 58 percent of the reported energy savings

portfolios include lighting measures; these programs are delivered in all sectors through a range of delivery mechanisms. As mentioned above, the Basic CFL Subprogram and Advanced Lighting Subprogram — both of which are delivered primarily through upstream incentives directed toward lighting manufacturers — comprise the vast majority of expected savings from lighting measures, and specialty CFLs comprise the vast majority of measures included in the Advanced Lighting Subprogram. In Southern California Edison's service territory, the Advanced Lighting Subprogram also includes a component that tests LED product incentive levels and sales in retail stores.

and Budgets. Page 7. October 1, 2009.

Other core programs in the 2010 – 2012 portfolios rely heavily on lighting measures, including the Multifamily Energy Efficiency Rebate Program (MFEER). According to Program Performance Metric (PPM) reporting for the 2011 program year, lighting measures comprised more than a third of PG&E's and SDG&E's reported savings and almost all of SCE's reported savings for 2011.<sup>5</sup> Several third party programs also focus on lighting, including the High Performance Office Lighting Program (HPOL). HPOL provides services (such as design assistance) as well as incentives for task/low ambient lighting design, daylighting, advanced controls, and other technologies and strategies to large commercial customers operating office buildings and warehouses.

New to the 2010 – 2012 portfolios is the Lighting Market Transformation program. The purpose of the program is to develop and test market transformation strategies for lighting products. This program has recently focused on developing a planning tool to assist program managers in determining the best strategies for specific lighting measures.

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5 San Diego Gas & Electric Company, 2012. Joint IOU Program Performance Metrics Report for Program Year 2011. Submitted as part of "San Diego Gas & Electric Company (U 902-M) Energy Efficiency 2011 Annual Report Including WE&T Task Force Annual Progress Report and Reporting on Program Performance Metrics." May 1, 2012. Note that this report includes 2011 PPM tracking information for SDG&E as well as PG&E and SCE.

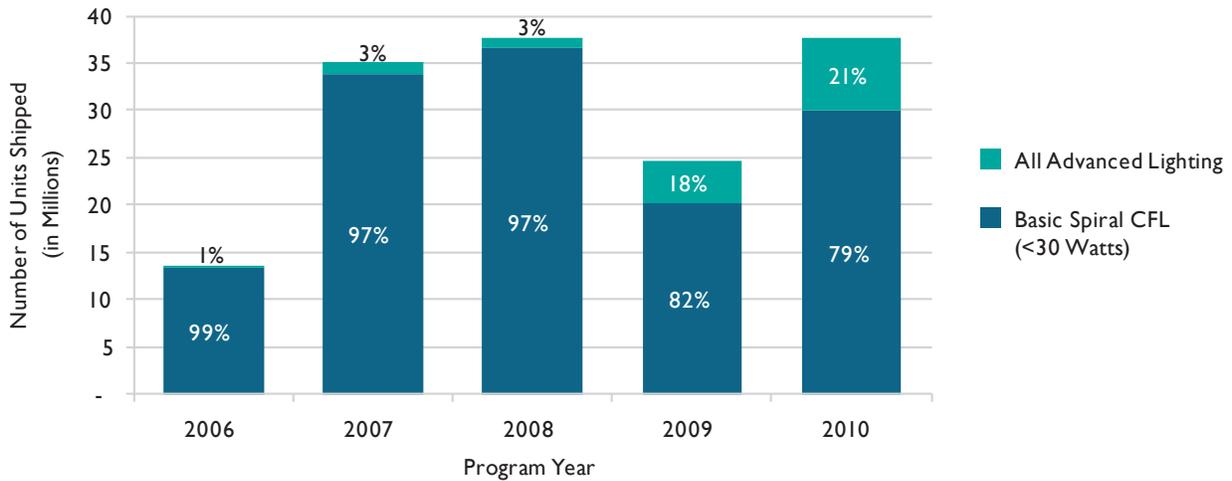
## Highlights

In the Basic CFL and Advanced Lighting Subprograms, the utilities provide incentives to lighting manufacturers which then ship discounted lighting products to retail stores. The utilities track these shipments, and tracking data for 2006 through 2010 suggests an increase over time in the quantity of advanced lighting measures delivered through upstream lighting programs (Figure 4). In 2009, advanced lighting measures comprised 18 percent of total upstream lighting measures shipped and increased slightly to 21 percent in 2010 (representing an increase of approximately 3.3 million units between years). Overall, the quantity of basic CFLs shipped each year between 2006 and 2010 is significantly greater than the quantity of advanced lighting measures shipped. The utilities are also required to track the quantity of measures for which incentives are provided and percentage of energy savings achieved through the Basic CFL Subprogram versus the Advanced Lighting Subprogram. In 2011 basic lighting comprised 40 to 70 percent of the units for which incentives were provided by each utility and 60 to 80 percent of reported kWh savings across the Basic and Advanced Lighting Subprograms.<sup>6</sup>

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6 San Diego Gas & Electric Company, 2012. Joint IOU Program Performance Metrics Report for Program Year 2011. Submitted as part of "San Diego Gas & Electric Company (U 902-M) Energy Efficiency 2011 Annual Report Including WE&T Task Force Annual Progress Report and Reporting on Program Performance Metrics." May 1, 2012. Note that this report includes 2011 PPM tracking information for SDG&E as well as PG&E and SCE.

**Figure 4.** Quantity of Basic Spiral CFLs and Advanced Lighting Measure Units Shipped through IOU Upstream Incentive Programs, 2006 – 2010



Source: Utility Tracking Data, 2006-2010

## Key Findings

Several recent and in-progress studies aim to understand program savings impacts and market trends, including program effectiveness in moving the market toward increased efficiency and advanced lighting measures. Evaluators recently conducted a trio of market studies — the Advanced Lighting Baseline Study, Fall 2011 California Lighting Retail Store Shelf Survey Report, and California LED Lamp Market Characterization Report — to enable better understanding of basic CFL and advanced lamp availability, diversity, and pricing in California.<sup>7</sup> The Fall 2011 California Lighting Retail Store Shelf Survey Report

<sup>7</sup> Advanced Lighting Baseline Study: Phases 1 and 2, KEMA, August 2011, [http://calmac.org/publications/110801\\_Advanced\\_Lighting\\_Baseline\\_Study\\_-\\_FINAL.pdf](http://calmac.org/publications/110801_Advanced_Lighting_Baseline_Study_-_FINAL.pdf);

California Lighting Retail Store Shelf Survey Report, Prepared for the California Public Utilities Commission, DNV KEMA, May 30, 2012 – DRAFT; California LED Lamp Market Characterization

involved visits to nearly 200 California lighting retail stores to collect detailed information on all of the lamps found in each store. Results suggest that while the availability and diversity of advanced lighting products have increased slightly between 2009 and 2011, basic CFLs still dominate the market and are available at lower prices than their advanced counterparts. Specific findings from this study include:

- Basic CFLs were available in 92 percent of the stores visited during the Fall 2011 shelf surveys, while specialty CFLs were available in 87 percent of stores and LED lamps available in 52 percent of stores;
- Aside from a small increase in the percentage of stores stocking LEDs, there was

Report. Prepared for the California Public Utilities Commission, DNV KEMA, June 12, 2012 - DRAFT.

little change in availability of basic CFLs or advanced lamps between 2009 and 2011;

- Advanced lamps represented 22 percent of all of the lamps stocked in Fall 2011 (19 percent were specialty CFLs and 3 percent were LED lamps), while basic CFLs comprised 27 percent of all lamps stocked;
- Among lamps with IOU discounts observed in Fall 2011, 31 percent were advanced lamps and 69 percent were basic CFLs;
- The average price for advanced lamps was \$5.78 per lamp (\$3.82 per lamp for specialty CFLs and \$15.67 per lamp for LED lamps) compared to \$1.80 per lamp for basic CFLs;
- Between 2009 and 2011, the average price for basic CFLs remained stable in the 3 big box channels (mass merchandise, wholesale club, and home improvement stores). Among advanced lamps, the average price for specialty CFLs declined slightly and the average price for LED lamps increased (likely due to increased diversity of LED lamp offerings);
- Data from 2009 on lamp installations in households within the 3 California electric IOU service territories (as opposed to stocking and pricing trends in retail stores within these territories) suggest a similar pattern; and
- The Advanced Lighting Baseline Study suggests that California residents had roughly three times as many basic CFLs installed in their homes as advanced lamps as of 2009 (much like retail store stock for advanced lamps, household installations of advanced lamps were comprised almost entirely of basic CFLs, while LEDs represented less than 0.5 percent of all lamps installed in 2009).

## Recommendations

Commission guidance on lighting has continued to encourage the promotion of advanced technologies and decreased focus on basic CFLs. Evaluation results and utility program tracking data suggest that the data trends do not yet bear out the desired transition away from basic CFLs. While the number of advanced lamps moving through the IOUs' upstream lighting programs has increased over time, basic CFLs are still the dominant lighting measure in the utility program portfolios. Market availability and pricing for advanced lighting products seems to be increasing over time, and additional data is necessary to identify whether increased adoption of these products is occurring among end-users, particularly as AB1109 continues to phase-in. The CPUC should continue to monitor and report on trends for basic CFLs and advanced lighting products both within the utility programs and in the broader California market.

## For More Information

Findings from studies related to local government partnerships may be found at [www.calmac.org](http://www.calmac.org) and [www.energydataweb.com](http://www.energydataweb.com). Several studies and reports are available and pending which are listed here:

### Completed Studies:

- *LED Market Characterization Report*, DNV-KEMA, June 2012, [http://www.energydataweb.com/cpucFiles/92/LEDMarketCharacterization\\_1.pdf](http://www.energydataweb.com/cpucFiles/92/LEDMarketCharacterization_1.pdf)
- *California Lighting Retail Store Shelf Survey Report*, DNV-KEMA, June 2012, [http://www.energydataweb.com/cpucFiles/92/CaliforniaLightingRetailStoreShelfSurveyReport\\_3.pdf](http://www.energydataweb.com/cpucFiles/92/CaliforniaLightingRetailStoreShelfSurveyReport_3.pdf)

## Lighting | 2010 – 2011 Energy Efficiency Evaluation Report

- *Lighting Market Transformation Workbook*, March 2012, <http://www.energydataweb.com/cpucFiles/pdaDocs/828/LMT%20Workbook%20Final%20Report%202-24-12.pdf>
- *SDG&E Residential Process Evaluation*, Evergreen Economics, March 2012, [http://www.calmac.org/publications/SDGE\\_Res\\_Process\\_Eval\\_Draft\\_FINAL.pdf](http://www.calmac.org/publications/SDGE_Res_Process_Eval_Draft_FINAL.pdf)
- *Statewide Advanced Lighting Baseline Study*, KEMA, October 2011, [http://www.calmac.org/publications/110801\\_Advanced\\_Lighting\\_Baseline\\_Study\\_-\\_FINAL.pdf](http://www.calmac.org/publications/110801_Advanced_Lighting_Baseline_Study_-_FINAL.pdf)

### Pending Studies:

A broad array of lighting research has been planned for the 2010 – 2012 program cycle and will produce results during 2012 and 2013. These studies will verify the IOUs' energy savings claims for lighting measures and continue monitoring the status of California's lighting market. One study (the LED Lamp Market Effects Study) will compare the status of California's market for LED replacement lamps to that of other states with historically low lighting incentive program activity, and another (Assessment of the Early Effects of EISA and AB1109 in California) will examine residential customer understanding of the AB1109 regulations and their planned purchasing activities when traditional incandescent lamps are no longer available.

A residential market share tracking study which looks at the share of energy efficient technologies available in the market will be available in July 2012. The IOUs will also continue their annual reporting of program performance metrics. These studies are listed below and evaluation plans and status can all be tracked on [www.energydataweb.com](http://www.energydataweb.com):

- Lighting Programs Process Evaluation and Market Characterization
- Residential Market Share Tracking
- Residential/Advanced/Upstream Lighting Impact Evaluation
- Nonresidential Downstream Lighting Impact Evaluation
- Market Effects and Transformation Research (LED component)
- Basic/Advanced/Lighting Market Transformation Program Evaluation & Residential/Non-Residential Lighting Customer Needs/Decision Characterization
- SCE/PG&E LMT Lighting Technology Roadmap
- LED Market Trial Study
- Consumer Preference Research to Support Lighting Programs
- SCE's Enhanced Inspection Study

# Financing



## Overview

Financing has been identified as an important tool for California to meet its energy efficiency goals. Financing can help support the purchase and installation of comprehensive, qualified energy efficiency measures by removing the up-front cost barriers. Per direction from the CPUC, California's IOUs offered on bill financing (OBF) to nonresidential customers as part of the 2010 – 2012 program cycle. On bill financing was popular among all sizes of commercial and government customers. The statewide \$41.5 million loan pool quickly became oversubscribed in the SCE territory with a majority of customers citing the availability of financing as a key driver in their decision to invest in energy efficiency upgrades. Financing will play an increasingly large role in the next program cycle, as the 2013 – 2014 Portfolio Guidance Decision

directed the utilities to set aside at least \$200 million for finance programs.<sup>1</sup>

On bill financing is classified as a non-resource program in the 2010-12 program cycle, which means the program is not required to report energy savings. The budget for on-bill financing activities in the 2010 – 2012 program cycle was about 3 percent of the portfolio and spending to date is less than one percent of the portfolio. As of the end of 2011, the OBF programs have initiated a total of 603 loans, primarily focused on small commercial, industrial, and agricultural firms. Most of the \$14 million loaned was from

<sup>1</sup> The minimum \$200M will be allocated toward the continuation of OBF, local government finance programs that originally received funding via ARRA, and four new pilot programs involving on bill repayment and credit enhancements for different customer sectors

SDG&E, in part because SDG&E began OBF in 2006.

**Table 15.** Financing Sector Budget

	Expenditures
	Million \$
Projected	\$82.1
Reported	\$10.7
% of Projected	13%

The following table includes a profile of OBF loans made through 2011 in the 2010 – 2012 cycle.<sup>2</sup>

**Table 16.** OBF Participation by Sector on a Per-loan Basis <sup>3,4</sup>

IOU	Number of Loans				Percent			
	G&I	Large CIA	Small CIA	Total	G&I	Large CIA	Small CIA	Total
SDG&E	47	48	411	506	9%	9%	81%	100%
SoCalGas	0	1	14	15	0%	7%	93%	100%
SCE	7	21	50	78	9%	27%	64%	100%
PG&E	0	2	2	4	0%	50%	50%	100%
Statewide	54	72	477	603	9%	12%	79%	100%

2 SCE received direction from the CPUC to shift an additional \$16 million from previously authorized SCE pre-2011 unspent, uncommitted efficiency funds, and up to \$15 million from 2010 – 2012 unspent, uncommitted efficiency funds from SCE’s local government and institutional partnership program to fund loans for all types of non-residential contractors.

3 2010 – 2012 On bill Financing Process Evaluation and Market Assessment, Cadmus Group, March 2012 <http://www.energydataweb.com/cpucFiles/pdaDocs/846/OBF%20Final%20Report.%20May%202012.pdf>

4 Two loans were issued under PG&E’s “off-bill” program. The numbers in the table reflect “on bill” loans only.

## Financing Programs

In the 2010 – 2012 cycle, California's IOUs offered OBF to nonresidential customers. Eligible customers applying for energy efficiency program rebates or incentives could finance the balance of their project costs using an OBF loan at zero percent interest. Loan installments are then included as a line item on the utility bill. Minimum loans are \$5,000 and the maximum loan varies by customer type and utility.<sup>5</sup>

## Highlights

In 2011, the OBF program was oversubscribed in the SCE service territory. In early 2012, the CPUC authorized additional OBF funds for SCE customers. Loans are currently available in all utility territories. There has been an extremely low default rate across the utilities (less than 1 percent), in part due to strict underwriting criteria and the “newness” of the OBF programs. As of the end of 2011, PG&E has made only 2 loans.

Financing will be categorized as a statewide resource program in 2013. New financing programs are to be designed for the 2013 – 2014 portfolio and offered on a statewide basis, including credit enhancements for single family homes; credit enhancement and on bill repayment (OBR) for multifamily properties; credit enhancements for small businesses; and OBR for all nonresidential customers.

<sup>5</sup> Differences in basic program offerings are described in “Table 35—Summary of On bill Financing Program Budgets and Loan Terms by IOU” in D.09-09-047 at p. 275-276

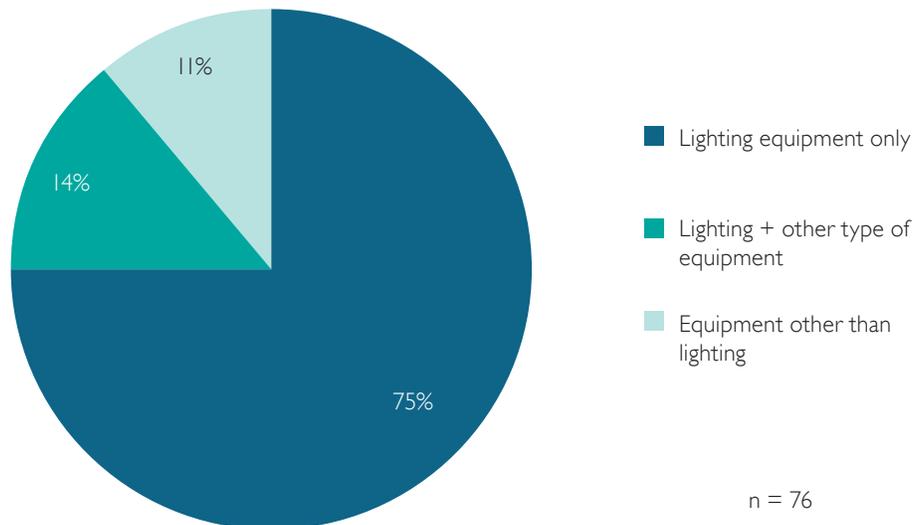
## Findings

A March 2012 Process Evaluation and Market Assessment of the On Bill Financing programs<sup>6</sup> described the program in detail and reviewed OBF's successes and challenges. Customers reported several key elements that they particularly favored about the program:

- Participants liked the zero percent interest, “bill neutral” loans (no bill increase), and on bill payment;
- At least 72 percent of surveyed customers reported they could not have overcome the first-cost barrier to retrofit their building without OBF;
- Seventy-five percent of projects were lighting-only [see figure 5];
- OBF contractors reported the direct install program undercut their ability to sell relatively comprehensive projects; and
- Program implementers were very satisfied with the ultra-low loan default rate of less than 1 percent within the program.

<sup>6</sup> See the 2010 – 2012 On bill Financing Process Evaluation and Market Assessment, Cadmus Group, March 2012 <http://www.energydataweb.com/cpucFiles/pdaDocs/846/OBF%20Final%20Report,%20May%202012.pdf>

**Figure 5.** Types of Equipment Financed with OBF



## Recommendations

Several recommendations specific to the 2010 – 2012 OBF programs were identified in the aforementioned evaluation report. Some recommendations from the evaluation were to make OBF-funded projects more comprehensive, eliminate any free riders, and de-conflict with direct install programs. For the next program cycle, the Commission provided guidance to the IOUs to develop a suite of financing options in the 2013 – 2014 energy efficiency program portfolio<sup>7</sup> with the following requirements:

- Re-categorization of energy efficiency finance as a statewide resource program;
- Continuation of OBF programs for non-residential customers;

- Provide ongoing funding for successful financing programs that were originally supported by ARRA (American Recovery and Reinvestment Act) stimulus funding;
- Development of a database of energy savings and loan performance data;
- Creation of four new financing programs involving credit enhancements and on bill repayment for single family, multifamily, non-residential and small business customers; and
- Hiring of an expert consultant, by SEMPRAs on behalf of all the IOUs, to convene workshops, work groups, and flesh out the new financing programs.

## For More Information

Findings from studies related to financings may be found at [www.calmac.org](http://www.calmac.org) and [www.energydataweb.com](http://www.energydataweb.com). Completed studies and links to the full reports are provided here:

<sup>7</sup> See Commission Decision D.12-05-015 at [http://docs.cpuc.ca.gov/WORD\\_PDF/FINAL\\_DECISION/166830.pdf](http://docs.cpuc.ca.gov/WORD_PDF/FINAL_DECISION/166830.pdf)

**Completed Studies:**

2010 – 2012 On Bill Financing Process Evaluation and Market Assessment, the Cadmus Group, May 2012  
<http://www.energydataweb.com/cpucFiles/pdaDocs/846/OBF%20Final%20Report,%20May%202012.pdf>

Energy Efficiency Finance in California: Needs and Gaps by Harcourt Brown & Carey, Inc., July 2011  
[http://www.cpuc.ca.gov/NR/rdonlyres/9A7637A9-BE7E-4762-B48F-93530D11DF8D/0/EEFinanceReport\\_final.pdf](http://www.cpuc.ca.gov/NR/rdonlyres/9A7637A9-BE7E-4762-B48F-93530D11DF8D/0/EEFinanceReport_final.pdf)

**Pending Studies:**

No new studies are planned for financing in the 2010 – 2012 program cycle. Assessments of the savings attributable to financing, pilot program implementation, and market research will be considered as part of a portfolio of research intended to understand the impacts from financing in the 2013 – 2014 program cycle.

**Other Resources:**

Materials from a CPUC hosted workshop on energy efficiency finance in February 2012 can be found at: <http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/>



## Appendix A — Reported Energy Savings by IOU, 2010 – 2011

The reported savings presented in this report are for the first two years of the 2010 – 2012 program cycle. Energy savings goals for each utility were established for the 2010 – 2012 program cycle in Commission Decision D.09-09-047. Energy savings goals are not established at a program level, which allows the utilities to be flexible with their sector-specific programs in how they wish to achieve utility-level goals. The following tables present IOU-reported energy savings

through 2010 – 2011 as compared to the savings goals for 2010 – 2012, as well as savings for 2010 – 2011:

- By sector broken out by electric and gas
- By end use broken out by electric and gas
- By sector by IOU broken out by electric and gas
- By end use by sector broken out by electric and gas

Energy Savings by Sector – Electric and Gas  
(Note: Reported Savings are Gross.)

Sector	Reported kW	Reported kWh	Reported therms
Agricultural	58,827	280,053,948	6,920,143
Commercial	591,148	2,890,684,291	51,189,382
Industrial	51,458	411,072,054	41,386,086
Residential	367,184	2,154,112,376	-15,249,430
<b>Total</b>	<b>1,068,617</b>	<b>5,735,922,670</b>	<b>84,246,181</b>

## Appendix A | 2010 – 2011 Energy Efficiency Evaluation Report

Energy Savings by End Use – Electric and Gas (Note: Reported Savings are Gross)

MeasureGroup	Reported kW	Reported kWh	Reported therms
Appliance	41,786	214,955,120	(2,547,539)
Building Envelope	21,550	30,527,194	4,438,737
Food Service	1,430	10,254,635	1,179,462
Greenhouse	-	91,383	1,359,799
HVAC	140,947	543,768,360	15,268,165
Indoor Lighting	623,417	3,370,643,145	(41,817,002)
Laundry	9,794	23,567,885	4,607,305
Other	1,928	25,661,326	1,928,288
Outdoor Lighting	2,584	109,107,402	(8,144)
Plug Loads	24,345	240,487,182	(3,130,787)
Process	111,530	699,533,956	77,522,936
Refrigeration	34,243	312,308,110	57,555
Survey	14,369	29,332,830	1,251,509
Water Heating	3,891	21,497,109	17,211,710
Whole building	36,803	104,187,032	6,924,189
<b>Total</b>	<b>1,068,617</b>	<b>5,735,922,670</b>	<b>84,246,181</b>

## 2010 – 2011 Energy Efficiency Evaluation Report | Appendix A

Energy Savings by Sector and IOU – Electric and Gas (Note: Reported Savings are Gross)

IOU	Sector	Reported kW	Reported kWh	Reported therms
PGE	Agricultural	41,245	165,119,729	6,177,212
SCE	Agricultural	17,581	114,934,219	310,790
SDGE	Agricultural	0	0	432,140
PGE	Commercial	218,237	1,185,509,707	13,234,051
SCE	Commercial	325,752	1,438,640,889	503,622
SCG	Commercial	0	-1	35,011,873
SDGE	Commercial	47,159	266,533,696	2,439,835
PGE	Industrial	24,171	207,900,928	41,358,238
SCE	Industrial	27,145	202,145,558	13,408
SDGE	Industrial	142	1,025,568	14,440
PGE	Residential	145,497	817,687,372	-8,257,392
SCE	Residential	178,812	1,118,164,988	-21,507,373
SCG	Residential	5,559	8,261,021	14,960,030
SDGE	Residential	37,316	209,998,996	-444,695
<b>Total</b>		<b>1,068,617</b>	<b>5,735,922,670</b>	<b>84,246,181</b>

## Appendix A | 2010 – 2011 Energy Efficiency Evaluation Report

Energy Savings by End Use and Sector – Electric and Gas (Note: Reported Savings are Gross)

Sector	MeasureGroup	Reported kW	Reported kWh	Reported therms
Agricultural	Process	53,543	220,967,815	5,137,225
Agricultural	Refrigeration	4,209	44,979,123	-
Agricultural	Food Service	14	45,339	18,438
Agricultural	Outdoor Lighting	112	5,068,927	-
Agricultural	HVAC	537	5,216,204	798,294
Agricultural	Water Heating	156	1,932,017	23,880
Agricultural	Appliance	18	100,297	(592)
Agricultural	Greenhouse	-	88,475	940,455
Agricultural	Laundry	9	21,549	2,442
Agricultural	Indoor Lighting	230	1,634,202	-
Commercial	Appliance	478	3,552,230	(9,893)
Commercial	Greenhouse	-	2,908	419,343
Commercial	Outdoor Lighting	2,424	90,760,016	(8,144)
Commercial	Food Service	1,417	10,209,296	1,160,412
Commercial	Process	12,216	100,557,045	32,001,992
Commercial	Whole building	31,004	99,288,872	6,287,204

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Sector	MeasureGroup	Reported kW	Reported kWh	Reported therms
Commercial	Refrigeration	29,330	260,650,427	57,555
Commercial	Building Envelope	11,766	19,934,711	1,499,991
Commercial	Laundry	173	415,235	47,139
Commercial	Other	5,371	30,316,174	2,395,800
Commercial	HVAC	107,203	505,269,998	9,678,085
Commercial	Plug Loads	4,300	43,226,059	(52,408)
Commercial	Water Heating	315	3,330,452	4,129,485
Commercial	Indoor Lighting	385,151	1,723,170,868	(6,417,177)
Industrial	Indoor Lighting	3,912	11,304,578	(200)
Industrial	Food Service	-	-	612
Industrial	Plug Loads	4	10,749	-
Industrial	Outdoor Lighting	44	3,768,488	-
Industrial	Water Heating	28	144,337	88,245
Industrial	HVAC	817	9,814,243	1,174,474
Industrial	Other	156	1,252,928	-
Industrial	Building Envelope	4	18,400	-
Industrial	Laundry	7	16,978	1,924
Industrial	Refrigeration	705	6,678,560	-

## Appendix A | 2010 – 2011 Energy Efficiency Evaluation Report

Sector	MeasureGroup	Reported kW	Reported kWh	Reported therms
Industrial	Appliance	11	53,698	(565)
Industrial	Process	45,771	378,009,096	40,121,597
Residential	Laundry	9,605	23,114,123	4,555,801
Residential	Appliance	41,278	211,248,895	(2,536,488)
Residential	Process	-	-	262,121
Residential	Outdoor Lighting	4	9,509,971	-
Residential	HVAC	32,390	23,467,914	3,617,313
Residential	Water Heating	3,392	16,090,304	12,970,100
Residential	Indoor Lighting	234,124	1,634,533,498	(35,399,625)
Residential	Whole building	5,799	4,898,160	636,985
Residential	Other	30	114,781	783,997
Residential	Building Envelope	9,781	10,574,083	2,938,746
Residential	Plug Loads	20,042	197,250,374	(3,078,379)
Residential	Survey	10,740	23,310,273	-
	<b>Total</b>	<b>1,068,617</b>	<b>5,735,922,670</b>	<b>84,246,181</b>

## Appendix B — IOU-Reported Savings Compared to CPUC Savings Goals Established in D. 09-09-047

This section presents a comparison of the IOUs' reported savings achievements as they relate to the energy savings goals adopted by the Commission for the 2010 – 2012 program cycle. Utility-reported savings are based on the utility records of installed technologies and the savings from those technologies based on pre-evaluation assumptions. Evaluated energy savings will be included in the Aggregate Report expected in July 2013. Energy savings goals

include 100 percent of savings attributed to Codes and Standards (for the 2006-2008 program cycle, the IOUs were allowed to apply only 50% of savings from Codes and Standards programs towards their savings goals achievement). Additionally, 100% of energy savings from Low Income Energy Efficiency programmatic efforts are applicable to the IOUs' energy savings goals achievements.

CPUC Goals from D.09-09-047		2010 Goal	2010 Reported	2011 Goal	2011 Reported	2010 – 2011 Goal	2010 – 2011 Reported
GWH	PG&E Annual	964	1,343	1,032	1,033	1,996	2,376
	PG&E Net Codes and Standards		226		363		589
GWH	SCE Annual	1,117	1,496	1,106	1,378	2,223	2,874
	SCE Net Codes and Standards		233		375		607
GWH	SDG&E Annual	195	230	187	248	382	478
	SDG&E Net Codes and Standards		53		85		138
	STATEWIDE	2,276	3,068	2,325	2,659	4,601	5,728
	Statewide Net Codes and Standards Savings		511		823	n/a	1,334

Appendix B | 2010 – 2011 Energy Efficiency Evaluation Report

CPUC Goals from D.09-09-047		2010 Goal	2010 Reported	2011 Goal	2011 Reported	2010 – 2011 Goal	2010 – 2011 Reported
MW	PG&E Annual	217	237	234	192	451	429
	PG&E Net Codes and Standards		41		59		101
MW	SCE Annual	244	283	243	267	487	549
	SCE Net Codes and Standards		43		61		104
MW	SDG&E Annual	39	40	37	44	76	85
	SDG&E Net Codes and Standards		10		14		24
	STATEWIDE	500	560	514	503	1,014	1,063
	Statewide Net Codes and Standards Savings		94		134	n/a	228
MILLION THERMS	PG&E Annual	16	19	16	34	32	53
	PG&E Net Codes and Standards		2		4		7
MILLION THERMS	SDG&E Annual	4	1	4	1	8	2
	SDG&E Net Codes and Standards		0.276		0.498		1
MILLION THERMS	SCG Annual	28	22	30	28	58	50
	SCG Net Codes and Standards		4		7		11
	STATEWIDE	47	42	50	63	98	105
	Statewide Net Codes and Standards Savings		7		12	n/a	19

## Appendix C — IOU-Reported Savings and Cost-Effectiveness by Program

Within each sector, the utilities administer a variety of programs designed to achieve cost-effective energy savings. The Commission relies on the Total Resource Cost Test (TRC) as the primary indicator of energy efficiency program cost effectiveness, consistent with the Commission's position that ratepayer-funded energy efficiency should focus on programs that serve as resource alternatives to supply-side options. The Total Resource Cost Test (TRC) measures the net resource benefits to all ratepayers by combining the net benefits of the program to participants and nonparticipants. The benefits are the avoided costs of the supply-side resources either avoided or deferred. The TRC costs encompass the cost of the measures or equipment installed [by the customer] and the costs incurred by the program administrator for both resource and non-resource program activities.

The Program Administrator Cost (PAC) test should also be considered in program and portfolio cost-effectiveness evaluations. In a portfolio-level evaluation of cost effectiveness, the PAC test measures program benefits as the TRC test does, but costs are defined differently to include those incurred by the program administrator, for resource and non-resource programs but exclude those costs incurred by the participating customers.

Because costs are specific to programs and it is not possible to disaggregate the benefits and costs to specific levels of measures or market sectors in a meaningful way, the cost effectiveness estimates provided are limited to the portfolio and program levels and are presented here.

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Program ID	Program Name	Chapter	Gross IOU-Reported					
			kW	kWh	Therms	TRC	PAC	
PGE21002	Residential Lighting Incentive Program for Basic CFLs	Lighting	70,588	499,872,632	-12,575,791	4.20	6.44	
PGE21003	Advanced Consumer Lighting Program	Lighting	13,357	94,508,015	-2,508,627	1.37	2.27	
PGE21004	Home Energy Efficiency Rebates	Residential	15,590	33,202,910	6,100,726	0.49	1.96	
PGE21005	Appliance Recycling Program	Residential	6,883	30,699,146	-319,973	0.98	0.92	
PGE21006	Business and Consumer Electronics Program	Residential	11,815	119,956,332	-1,494,245	1.62	2.01	
PGE21007	Multifamily Energy Efficiency Rebates Program	Residential	2,376	13,551,369	503,603	0.89	1.61	
PGE21008	Whole House Performance Program	Residential	1,345	1,455,928	299,454	0.27	0.45	
PGE21011	Calculated Incentives	Commercial	26,693	212,207,190	2,941,056	1.05	2.81	
PGE21012	Deemed Incentives	Commercial	62,208	322,015,171	1,261,129	1.53	3.12	
PGE21014	Nonresidential Audits Program	Commercial	3,239	5,373,898	1,125,765	0.00	0.00	
PGE21021	Calculated Incentives	Ag / Ind	9,170	75,176,698	24,467,558	1.89	4.93	
PGE21022	Deemed Incentives	Ag / Ind	7,513	31,438,822	1,233,723	2.05	2.90	
PGE21024	Nonresidential Audits Program	Ag / Ind	201	336,738	61,516	0.00	0.00	

Program ID	Program Name	Chapter	Gross IOU-Reported					
			kW	kWh	Therms	TRC	PAC	
PGE21031	Calculated Incentives	Ag / Ind	12,622	68,289,380	4,850,656	1.81	3.31	
PGE21032	Deemed Incentives	Ag / Ind	26,854	71,203,377	1,543,804	1.80	4.03	
PGE21034	Nonresidential Audits Program	Ag / Ind	188	311,921	64,228	0.00	0.00	
PGE21035	Pump Efficiency Services Program	Ag / Ind	4,543	38,047,283	-	1.45	3.42	
PGE21041	Residential New Construction	Residential	2,112	2,035,874	321,316	0.38	0.44	
PGE21042	Savings By Design	Commercial	15,959	66,258,765	883,526	2.80	3.14	
PGE21061	Upstream HVAC Equipment Incentive	HVAC	6,533	11,892,261	-97,333	1.10	1.40	
PGE21063	Commercial Quality Installation	HVAC	2	3,976	14	0.00	0.00	
PGE21064	ENERGY STAR Residential Quality Installation Program	HVAC	426	193,539	25,981	0.19	0.20	
PGE21065	Residential Quality Maintenance and Commercial Quality Maintenance Development	HVAC	14,135	9,653,519	217,116	0.58	0.63	
PGE2125	Local Government Energy Action Resource (LGEAR)	Local Governments	1,655	7,497,954	-41,102	0.58	0.71	
PGE21261	California Community Colleges	Commercial	2,354	6,005,223	447,340	0.33	1.96	

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Program ID	Program Name	Chapter	Gross IOU-Reported					
			kW	kWh	Therms	TRC	PAC	
PGE21262	University of California/California State University	Commercial	5,047	33,235,502	2,287,907	0.91	1.67	
PGE21263	State of California	Commercial	670	3,368,433	118,448	0.63	1.53	
PGE21264	Department of Corrections and Rehabilitation	Commercial	858	10,955,519	86,335	1.57	2.26	
PGE2130	Association of Monterey Bay Area Governments (AMBAG) Energy Watch	Local Governments	1,738	11,841,250	-112,195	0.97	1.08	
PGE2131	City of San Joaquin Energy Watch	Local Governments	80	354,995	-4,792	0.72	0.80	
PGE2132	East Bay Energy Watch	Local Governments	9,271	49,732,829	-305,568	1.64	2.16	
PGE2133	Fresno County Energy Watch	Local Governments	3,706	15,304,480	-96,800	1.28	1.91	
PGE2134	Kern County Energy Watch	Local Governments	2,467	12,220,110	-82,792	1.03	1.08	
PGE2135	Madera County Energy Watch	Local Governments	257	1,162,949	-8,112	1.41	1.77	
PGE2136	Marin County Energy Watch	Local Governments	990	4,914,429	-23,987	1.17	1.32	
PGE2137	Mendocino County Energy Watch	Local Governments	139	555,288	-2,798	0.83	0.98	
PGE2138	Napa County Energy Watch	Local Governments	262	2,207,235	-8,934	0.88	1.25	
PGE2139	Redwood Energy Watch	Local Governments	1,305	4,309,517	6,577	0.82	0.99	

Program ID	Program Name	Chapter	Gross IOU-Reported					
			kW	kWh	Therms	TRC	PAC	
PGE2140	San Joaquin County Energy Watch	Local Governments	728	3,706,843	-26,752	1.25	1.26	
PGE2141	San Luis Obispo County Energy Watch	Local Governments	746	3,894,593	-24,421	0.84	0.89	
PGE2142	San Mateo County Energy Watch	Local Governments	818	5,256,396	-25,403	0.83	1.17	
PGE2143	Santa Barbara County Energy Watch	Local Governments	707	3,540,428	-26,780	0.87	0.92	
PGE2144	Sierra Nevada Energy Watch	Local Governments	1,624	9,628,948	-64,277	0.90	1.27	
PGE2145	Sonoma County Energy Watch	Local Governments	606	3,790,688	14,072	0.50	1.54	
PGE2146	Silicon Valley Energy Watch	Local Governments	1,423	8,035,583	191,242	0.88	1.36	
PGE2147	San Francisco Energy Watch	Local Governments	5,295	33,722,844	819,005	1.62	1.82	
PGE2176	California New Homes Multifamily	Residential	298	710,776	51,719	0.23	0.21	
PGE2177	Enhance Time Delay Relay	Residential	2,899	1,354,800	-612	0.72	0.76	
PGE2178	ENERGY STAR Manufactured Homes	Residential	182	213,740	11,812	0.41	0.46	
PGE2179	Direct Install for Manufactured and Mobile Homes	Residential	4,571	5,475,022	192,600	1.54	1.54	
PGE2181	Air Care Plus	Commercial	8,203	40,547,568	653,269	1.64	1.77	

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Program ID	Program Name	Chapter	Gross IOU-Reported					
			kW	kWh	Therms	TRC	PAC	
PGE2182	Boiler Energy Efficiency Program	Ag / Ind	39	537,560	967,442	0.59	1.05	
PGE2183	Comprehensive Retail Energy Management	Commercial	250	3,391,661	-3,178	1.29	1.58	
PGE2185	EnergySmart Grocer	Commercial	3,420	41,867,066	3,583	1.87	2.60	
PGE2186	Enhanced Automation Initiative	Commercial	-	-	1,176,913	5.80	6.65	
PGE2187	Monitoring-Based Persistence Commissioning	Commercial	501	3,546,902	108,774	1.01	1.55	
PGE2189	Cool Controls Plus	Commercial	5,399	14,256,166	61,272	2.11	2.11	
PGE2190	LodgingSavers	Commercial	3,145	14,826,876	18,522	1.31	1.32	
PGE2191	Medical Building Tune-Up	Commercial	110	933,926	20,420	0.54	0.54	
PGE2193	School Energy Efficiency	Commercial	324	5,773,653	1,677,371	1.02	1.22	
PGE2194	Energy Fitness Program	Commercial	6,068	22,331,633	-105,735	1.73	2.43	
PGE2195	Energy Savers	Commercial	1,222	8,106,097	-40,964	1.51	2.05	
PGE2196	RightLights	Lighting	6,204	36,114,860	-335,706	2.07	2.05	
PGE2197	Small Business Commercial Comprehensive	Commercial	1,538	18,670,548	-7,150	1.87	1.87	

Program ID	Program Name	Chapter	Gross IOU-Reported					
			kW	kWh	Therms	TRC	PAC	
PGE2198	DCCCP Quest	Commercial	70	615,214	-	0.43	0.47	
PGE2199	Energy-Efficient Parking Garage	Commercial	550	4,455,302	-	1.39	1.60	
PGE2200	Furniture Store Energy Efficiency	Commercial	1,252	5,346,740	-32,115	0.81	0.82	
PGE2201	High Performance Office Lighting	Lighting	503	3,139,480	-	0.68	0.68	
PGE2202	LED Accelerator	Lighting	1,116	4,408,683	-105,447	0.81	0.96	
PGE2204	SmartVent for Energy-Efficient Kitchens	Commercial	508	3,168,099	78,847	1.12	1.12	
PGE2205	Casino Green	Commercial	646	3,134,017	6,916	1.03	1.04	
PGE2206	Healthcare Energy Efficiency Program	Commercial	-	985,518	35,317	0.18	0.19	
PGE2209	Ozone Laundry Energy Efficiency	Commercial	-	-	382,488	1.33	1.56	
PGE2212	California Preschool Energy Efficiency Program	Commercial	222	3,873,064	-67,366	1.44	1.45	
PGE2213	K-12 Private Schools and Colleges Audit Retro	Commercial	442	2,496,049	-17,016	0.47	0.60	
PGE2214	EE Entertainment Centers	Commercial	493	895,990	-2,345	0.14	0.14	
PGE2220	AIM Compressed Air Efficiency	Ag / Ind	21	185,321	-	0.14	0.14	

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Program ID	Program Name	Chapter	Gross IOU-Reported					
			kW	kWh	Therms	TRC	PAC	
PGE2221	California Wastewater Process Optimization	Ag / Ind	658	5,252,163	-	0.55	1.30	
PGE2222	Energy Efficiency Services for Oil Production	Ag / Ind	8,341	85,332,851	-	1.58	3.80	
PGE2223	Heavy Industry Energy Efficiency Program	Ag / Ind	5,332	39,693,856	3,261,218	1.42	2.09	
PGE2224	Industrial Compressed Air	Ag / Ind	1,603	11,775,463	-	1.47	2.17	
PGE2225	Refinery Energy Efficiency Program	Ag / Ind	967	8,344,846	11,124,364	2.00	5.41	
PGE2227	Cement Production and Distribution Energy Efficiency	Ag / Ind	6	32,810	-	0.02	0.02	
PGE2228	Industrial Recommissioning Program	Ag / Ind	495	4,232,837	1,286,834	1.23	1.31	
PGE2230	Dairy Energy Efficiency Program	Ag / Ind	383	2,657,872	0	1.03	1.68	
PGE2231	Industrial Refrigeration Performance Plus	Ag / Ind	928	5,988,630	-	0.46	1.75	
PGE2232	Light Exchange Program	Ag / Ind	-	3,654,002	-	1.16	1.16	
PGE2233	Wine Industry Efficiency Solutions	Ag / Ind	1,881	6,844,142	93,088	0.84	1.37	
PGE2234	Comprehensive Food Process Audit & Resource Efficiency Pgm	Ag / Ind	382	2,489,578	-	0.62	0.68	
PGE2235	Dairy Industry Resource Advantage Pgm	Ag / Ind	485	2,223,691	-4,438	1.23	1.49	

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Program ID	Program Name	Chapter	Gross IOU-Reported					
			kW	kWh	Therms	TRC	PAC	
PGE2236	Process Wastewater Treatment EM Pgm for Ag Food Processing	Ag / Ind	391	3,405,884	-	1.76	2.19	
SCE-L-004A	City of Beaumont Energy Leader Partnership	Local Governments	2	23,683	-	0.07	0.07	
SCE-L-004B	City of Long Beach Energy Leader Partnership	Local Governments	49	659,637	-65	0.96	0.85	
SCE-L-004C	City of Redlands Energy Leader Partnership	Local Governments	182	757,365	-	1.21	0.98	
SCE-L-004E	City of Santa Ana Energy Leader Partnership	Local Governments	120	1,155,600	-5,016	1.65	1.24	
SCE-L-004F	City of Simi Valley Energy Leader Partnership	Local Governments	33	147,485	-	0.45	0.43	
SCE-L-004G	City of South Gate Energy Leader Partnership	Local Governments	11	274,931	-	0.36	0.34	
SCE-L-004H	Community Energy Leader Partnership	Local Governments	455	5,731,589	-280	1.81	1.54	
SCE-L-004I	Desert Cities Energy Leader Partnership	Local Governments	363	1,415,584	-82	1.85	1.25	
SCE-L-004J	Eastern Sierra Energy Leader Partnership	Local Governments	1	5,404	-	0.01	0.01	
SCE-L-004M	Orange County Cities Energy Leader Partnership	Local Governments	-	753,915	-	1.51	1.21	
SCE-L-004N	Palm Desert Demonstration Partnership	Local Governments	1,088	4,674,956	-4,982	1.11	0.62	
SCE-L-004O	San Gabriel Valley Energy Leader Partnership	Local Governments	668	4,505,678	-142	1.73	1.48	

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Program ID	Program Name	Chapter	Gross IOU-Reported					
			kW	kWh	Therms	TRC	PAC	
SCE-L-004P	San Joaquin Valley Energy Leader Partnership	Local Governments	520	4,220,012	-236	2.61	1.92	
SCE-L-004Q	South Bay Energy Leader Partnership	Local Governments	302	2,002,114	-374	1.05	0.91	
SCE-L-004R	South Santa Barbara County Energy Leader Partnership	Local Governments	57	277,701	-58	0.21	0.21	
SCE-L-004S	Ventura County Energy Leader Partnership	Local Governments	57	561,375	-	0.33	0.31	
SCE-L-004U	Western Riverside Energy Leader Partnership	Local Governments	94	593,888	-6	0.53	0.49	
SCE-L-005A	California Community Colleges Energy Efficiency Partnership	Commercial	3,422	15,053,480	9,199	2.45	1.61	
SCE-L-005B	California Department of Corrections and Rehabilitation Energy Efficiency Partnership	Commercial	361	2,542,156	509,672	2.12	1.36	
SCE-L-005C	County of Los Angeles Energy Efficiency Partnership	Local Governments	490	3,841,962	-1,468	4.55	2.35	
SCE-L-005D	County of Riverside Energy Efficiency Partnership	Local Governments	238	484,299	1,524	0.85	0.65	
SCE-L-005E	County of San Bernardino Energy Efficiency Partnership	Local Governments	335	1,088,629	-1,229	1.31	1.25	
SCE-L-005F	State of California Energy Efficiency Partnership	Commercial	569	2,525,923	-5,162	2.04	1.54	
SCE-L-005G	UC/CSU Energy Efficiency Partnership	Commercial	3,738	24,945,640	250,169	3.19	1.89	

Gross IOU-Reported									
Program ID	Program Name	Chapter	kW	kWh	Therms	TRC	PAC		
SCE-SW-001A	Home Energy Efficiency Survey Program	Residential	12,233	36,152,215	-113,359	1.01	1.95		
SCE-SW-001B	Residential Lighting Incentive Program for Basic CFLs	Lighting	114,750	724,883,586	-11,398,515	17.43	8.33		
SCE-SW-001C	Advanced Consumer Lighting Program	Lighting	58,345	396,383,189	-5,948,527	13.39	5.90		
SCE-SW-001D	Home Energy Efficiency Rebate Program	Residential	9,927	30,065,898	4,238	1.29	1.30		
SCE-SW-001E	Appliance Recycling Program	Residential	24,546	126,430,251	-2,644,910	1.46	1.46		
SCE-SW-001F	Business and Consumer Electronics Program	Residential	6,980	65,976,558	-1,354,401	3.32	4.32		
SCE-SW-001G	Multifamily Energy Efficiency Rebate Program	Residential	3,667	43,989,316	-333,851	1.18	1.35		
SCE-SW-001H	Whole House Prescriptive Program	Residential	13	2,796	726	0.00	0.00		
SCE-SW-002B	Calculated Incentives Program	Commercial	20,793	147,954,093	-	4.30	3.12		
SCE-SW-002C	Deemed Incentives Program	Commercial	91,935	339,367,573	-637,454	2.01	4.40		
SCE-SW-002D	Commercial Direct Install Program	Commercial	67,988	307,542,736	850,666	9.95	2.26		
SCE-SW-003B	Industrial Calculated Energy Efficiency Program	Ag / Ind	18,144	150,159,849	-	6.40	3.98		
SCE-SW-003C	Industrial Deemed Energy Efficiency Program	Ag / Ind	23,126	82,201,275	-82,989	2.42	4.18		

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Program ID	Program Name	Chapter	Gross IOU-Reported					
			kW	kWh	Therms	TRC	PAC	
SCE-SW-004B	Agriculture Calculated Energy Efficiency Program	Ag / Ind	5,586	34,626,922	-	3.77	2.65	
SCE-SW-004C	Agriculture Deemed Energy Efficiency Program	Ag / Ind	956	4,220,100	-10,061	1.20	1.75	
SCE-SW-004E	Pump Test Services Program	Ag / Ind	5,050	20,118,671	-	1.65	1.65	
SCE-SW-005A	Savings By Design	Commercial	21,429	109,840,083	387,737	6.05	3.61	
SCE-SW-005B	California Advanced Homes	Residential	3,718	2,747,017	236,330	0.54	0.56	
SCE-SW-007A	Upstream HVAC Equipment Incentive	HVAC	17,409	46,632,263	-	7.82	19.70	
SCE-SW-007D	ENERGY STAR Residential Quality Installation Program	HVAC	243	445,876	-	0.08	0.06	
SCE-SW-007E	Residential Quality Maintenance and Commercial Quality Maintenance Development	HVAC	5,676	6,684,472	-290	0.33	0.32	
SCE-SW-010B	WE&T Connections	WE&T	1,214	7,463,527	-102,040	0.57	0.54	
SCE-TP-002	Comprehensive Mobile Home	Residential	3,268	15,082,308	-199,588	8.62	1.46	
SCE-TP-003	Comprehensive Home Performance	Residential	204	178,549	11,367	0.03	0.03	
SCE-TP-006	Healthcare EE Program (HEEP)	Commercial	863	5,992,807	-103	1.69	1.49	

Program ID	Program Name	Chapter	Gross IOU-Reported					
			kW	kWh	Therms	TRC	PAC	
SCE-TP-008	Comprehensive Beverage Manufacturing and Resource Efficiency	Ag / Ind	38	328,234	-	0.34	0.33	
SCE-TP-010	Data Center Energy Efficiency	Commercial	42	643,740	-3	0.25	0.24	
SCE-TP-012	Lodging EE Program (LEEP)	Commercial	480	2,781,076	-55	0.94	0.88	
SCE-TP-013	Food & Kindred Products	Commercial	1,994	16,386,986	-73	2.64	2.09	
SCE-TP-014	Primary and Fabricated Metals	Ag / Ind	1,404	12,375,519	-	2.25	2.02	
SCE-TP-016	Nonmetallic Minerals and Products	Ag / Ind	1,672	11,727,687	-	2.42	2.06	
SCE-TP-017	Comprehensive Chemical Products	Ag / Ind	60	350,650	-397	0.21	0.20	
SCE-TP-018	Chemical Products Efficiency Program (CPEP)	Ag / Ind	30	172,490	-	0.20	0.19	
SCE-TP-019	Comprehensive Petroleum Refining	Ag / Ind	54	462,739	-	0.42	0.40	
SCE-TP-020	Oil Production	Ag / Ind	1,217	10,496,023	-	2.74	2.21	
SCE-TP-023	Cool Schools	Commercial	48	93,995	-	0.11	0.11	
SCE-TP-024	Public Pre-Schools, Elementary Schools and High Schools	Commercial	1,962	10,909,453	-52,768	8.08	1.86	
SCE-TP-025	Retail Energy Action Program (REAP)	Commercial	1,048	5,040,699	-745	1.39	1.16	

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Program ID	Program Name	Chapter	Gross IOU-Reported					
			kW	kWh	Therms	TRC	PAC	
SCE-TP-026	Commercial Utility Building Efficiency (CUBE)	Commercial	359	1,635,536	-	0.40	0.39	
SCE-TP-031	Management Affiliates Program (MAP)	Commercial	1,918	7,033,809	-8,783	3.99	2.14	
SCE-TP-033	Automatic Energy Review for Schools	Commercial	18	95,863	-	9.48	5.56	
SCE-TP-036	Energy Efficiency for Entertainment Centers	Commercial	4,206	4,585,499	-17,841	6.91	1.97	
SCE-TP-037	Private Schools and Colleges Program	Commercial	627	2,206,255	-11,820	3.83	1.49	
SCE-TP-038	California Preschools Program (CPEEP)	Commercial	894	3,174,463	-3,506	1.93	0.95	
SCG3601	Local05 - Local Non-Residential BID	Residential	-	-	2,576,081	2.29	5.76	
SCG3602	SW-AgA - Calculated	Ag / Ind	-	-	535,327	1.80	2.58	
SCG3603	SW-AgB - Deemed	Ag / Ind	-	-	569,942	1.17	1.38	
SCG3607	SW-ComA - Calculated	Commercial	-	-	2,720,852	2.25	3.46	
SCG3608	SW-ComB - Deemed	Commercial	0	-1	2,606,689	1.02	1.48	
SCG3611	SW-IndA - Calculated	Ag / Ind	-	-	18,771,152	2.71	6.20	
SCG3612	SW-IndB - Deemed	Ag / Ind	0	0	6,656,226	5.86	8.39	

Program ID	Program Name	Chapter	Gross IOU-Reported					
			kW	kWh	Therms	TRC	PAC	
SCG3615	SW-ResA - Multifamily EE Rebates	Residential	7	12,193	755,273	1.04	1.72	
SCG3616	SW-ResB - Home Efficiency Rebates	Residential	2,840	5,829,352	8,520,712	0.72	2.21	
SCG3625	SW-NCNR - NRNC Savings By Design	Commercial	-	-	119,394	0.94	1.36	
SCG3626	SW-NCResA - RNC	Residential	2,712	2,407,027	270,398	2.63	4.71	
SCG3664	3P-Res01 - On Demand Efficiency	Residential	-	12,449	1,012,323	1.20	1.41	
SCG3666	3P-Res03 - Multifamily Home Tune-Up	Residential	-	-	296,090	0.78	0.78	
SCG3667	3P-Res04 - Multifamily Solar Pool Heating	Residential	-	-	8,063	0.12	0.13	
SCG3669	3P-Res06 - Multifamily Direct Therm Savings	Residential	-	-	1,157,664	0.82	0.86	
SCG3670	3P-Res07 - LivingWise	Residential	-	-	782,180	1.72	2.07	
SCG3671	3P-Res09 - Manufactured Mobile Home	Residential	-	-	1,467,967	1.14	1.16	
SCG3672	3P-Xc01 - Gas Cooling Retrofit	Commercial	-	-	58,361	0.73	0.77	
SCG3673	3P-Xc02 - SaveGas Hot Water Control	Commercial	-	-	456,210	1.27	2.11	
SCG3674	3P-Xc03 - Upstream High Efficiency Gas Water Heater	Residential	-	-	630,999	0.61	2.38	

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Program ID	Program Name	Chapter	Gross IOU-Reported					
			kW	kWh	Therms	TRC	PAC	
SDGE3101	SW-AgB - Deemed	Ag / Ind	25	165,993	406,578	1.77	2.02	
SDGE3105	SW-ComA - Calculated	Commercial	2,706	25,053,902	341,887	1.54	4.41	
SDGE3106	SW-ComB - Deemed	Commercial	12,512	70,652,365	85,343	2.28	4.86	
SDGE3109	SW-IndA - Calculated	Ag / Ind	391	3,045,698	87,377	1.21	2.13	
SDGE3110	SW-IndB - Deemed	Ag / Ind	1,181	5,922,891	17,478	1.93	3.59	
SDGE3113	SW-ResA - Residential Basic Lighting	Lighting	17,106	119,703,086	-1,909,038	4.14	4.64	
SDGE3114	SW-ResB - Advanced Consumer Lighting	Lighting	3,480	29,135,301	-381,156	2.70	3.58	
SDGE3115	SW-ResG - Business/Consumer Electronics/Plug Load	Residential	833	7,935,506	-163,690	1.95	1.93	
SDGE3116	Local01 - Local Whole House Performance	Residential	166	187,683	18,038	1.12	1.16	
SDGE3117	Local03 - Local Non-Residential (BID)	Commercial	12,144	99,402,214	1,050,334	1.92	3.69	
SDGE3118	SW-NCNR - NRNC Savings By Design	Commercial	4,874	22,429,543	827,258	1.96	2.65	
SDGE3119	SW-ResC - Multi-Family	Residential	1,162	5,722,784	277,089	1.17	1.52	
SDGE3121	SW-ResD - Home Efficiency Rebates	Residential	3,749	9,455,316	1,523,795	1.04	3.30	

Program ID	Program Name	Chapter	Gross IOU-Reported					
			kW	kWh	Therms	TRC	PAC	
SDGE3137	Local02 - Local Island Program	Commercial	67	161,309	-	0.25	0.25	
SDGE3156	SW-ResH - Prescriptive Whole House Retrofit	Residential				0.00	0.00	
SDGE3160	SW-NCResa - RNC	Residential	829	626,145	79,116	1.63	2.26	
SDGE3161	3P-NRes01 - Non-Res HVAC Tune-up/Quality Installa	HVAC	7,930	16,801,766	-5,191	7.21	9.67	
SDGE3162	3P-NRes02 - SaveGas Hot Water Control	Commercial	-	-	147,000	1.58	3.34	
SDGE3167	3P-NRes09 - Mobile Energy Clinic (MEC)	Commercial	1,774	8,059,743	78,222	6.85	6.99	
SDGE3170	3P-NRes13 - Retro Commissioning (RCx)	Commercial	139	1,971,998	23,437	0.96	0.99	
SDGE3171	3P-Res01 - Res HVAC Tune-up/Quality Installation	HVAC	3,361	2,950,792	33,323	2.14	2.53	
SDGE3172	3P-Res02 - Comprehensive Mobile Home (SW)	Residential	2,322	4,066,258	104,699	0.83	1.02	
SDGE3174	SW-ComE - Direct Install	Commercial	3,479	14,515,154	-167,925	1.23	1.23	
SDGE3175	SW-ResF - Appliance Recycling	Residential	4,386	29,592,814	-32,254	1.13	1.51	



## Appendix D — Avoided GHG Emissions by Program

In addition to energy savings, the IOUs' energy efficiency programs also produce reductions in CO<sub>2</sub>, NO<sub>x</sub>, and particulate emissions that would have otherwise occurred in California. The CPUC uses an emissions rate for electric and gas savings that is dependent on the type of installed technology. The calculations for each technology are embedded in the E3 Calculators and, subsequently, the ERT that Energy Division used to estimate portfolio energy savings and other impacts.

Electric:  $ER[CO_2]M$  = Emission rate of CO<sub>2</sub> in tons per kWh of measure M.

Gas:  $ER[CO_2]GCT$  = Emission rate of CO<sub>2</sub> in tons per therm, based on the gas combustion type (GCT) specified on the input sheet for the measure.

NO<sub>x</sub> and PM<sup>10</sup> equations are the same and require only the replacement of [CO<sub>2</sub>] with the appropriate indicator. Note that CO<sub>2</sub> emission rate is in tons per kWh. NO<sub>x</sub> and PM<sup>10</sup> are in pounds per kWh.

The estimated emissions reductions provided in this section are IOU and program-level results based on gross savings.

GHG and PM Emissions Reductions by IOU

IOU	Electric			Gas	
	CO <sub>2</sub>	NO <sub>x</sub>	PM <sup>10</sup>	CO <sub>2</sub>	NO <sub>x</sub>
PGE	1,336,441	357,201	172,190	307,196	483,111
SCE	1,628,863	437,266	209,626	-120,975	-191,954
SCG	4,891	1,359	624	292,336	459,742
SDGE	269,983	72,383	34,757	14,284	22,464

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GHG and PM Emissions Reductions by program

ProgramID	ProgramName	ReportChapter	Electric			Gas		
			CO <sub>2</sub>	NO <sub>x</sub>	PM <sup>10</sup>	CO <sub>2</sub>	NO <sub>x</sub>	NO <sub>x</sub>
PGE21002	Residential Lighting Incentive Program for Basic CFLs	Lighting	278,540	73,723	35,979	-73,568	-115,697	
PGE21003	Advanced Consumer Lighting Program	Lighting	52,662	13,938	6,802	-14,675	-23,079	
PGE21004	Home Energy Efficiency Rebates	Residential	18,312	4,805	2,371	35,689	56,127	
PGE21005	Appliance Recycling Program	Residential	16,797	4,377	2,178	-1,872	-2,944	
PGE21006	Business and Consumer Electronics Program	Residential	66,842	17,692	8,634	-8,741	-13,747	
PGE21007	Multifamily Energy Efficiency Rebates Program	Residential	7,560	2,003	976	2,946	4,633	
PGE21008	Whole House Performance Program	Residential	869	243	111	1,752	2,755	
PGE21011	Calculated Incentives	Commercial	125,373	34,759	15,996	17,205	27,058	
PGE21012	Deemed Incentives	Commercial	182,122	48,798	23,450	7,378	11,602	
PGE21014	Nonresidential Audits Program	Commercial	0	0	0	6,586	10,357	
PGE21021	Calculated Incentives	Ag / Ind	41,281	10,791	5,349	143,135	225,102	
PGE21022	Deemed Incentives	Ag / Ind	17,772	4,760	2,289	7,217	11,350	

ProgramID	ProgramName	ReportChapter	Electric			Gas		
			CO <sub>2</sub>	NO <sub>x</sub>	PM <sup>10</sup>	CO <sub>2</sub>	NO <sub>x</sub>	NO <sub>x</sub>
PGE21024	Nonresidential Audits Program	Ag / Ind	0	0	0	360	566	
PGE21031	Calculated Incentives	Ag / Ind	37,792	9,945	4,889	28,376	44,626	
PGE21032	Deemed Incentives	Ag / Ind	39,171	10,256	5,074	9,031	14,203	
PGE21034	Nonresidential Audits Program	Ag / Ind	0	0	0	376	591	
PGE21035	Pump Efficiency Services Program	Ag / Ind	20,610	5,325	2,679	0	0	
PGE21041	Residential New Construction	Residential	1,207	335	154	1,880	2,956	
PGE21042	Savings By Design	Commercial	39,729	11,136	5,054	5,169	8,128	
PGE21061	Upstream HVAC Equipment Incentive	HVAC	7,267	2,065	921	-569	-895	
PGE21063	Commercial Quality Installation	HVAC	3	1	0	0	0	
PGE21064	ENERGY STAR Residential Quality Installation Program	HVAC	118	34	15	152	239	
PGE21065	Residential Quality Maintenance and Commercial Quality Maintenance Development	HVAC	6,193	1,819	777	1,270	1,997	
PGE2125	Local Government Energy Action Resource (LGEAR)	Local Governments	4,274	1,153	549	-240	-378	

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ProgramID	ProgramName	ReportChapter	Electric			Gas		
			CO <sub>2</sub>	NO <sub>x</sub>	PM <sup>10</sup>	CO <sub>2</sub>	NO <sub>x</sub>	NO <sub>x</sub>
PGE21261	California Community Colleges	Commercial	3,509	965	449	2,617	4,116	
PGE21262	University of California/California State University	Commercial	19,213	5,239	2,462	13,384	21,049	
PGE21263	State of California	Commercial	1,910	513	246	693	1,090	
PGE21264	Department of Corrections and Rehabilitation	Commercial	6,457	1,787	824	505	794	
PGE2130	Association of Monterey Bay Area Governments (AMBAG) Energy Watch	Local Governments	6,628	1,761	855	-656	-1,032	
PGE2131	City of San Joaquin Energy Watch	Local Governments	203	55	26	-28	-44	
PGE2132	East Bay Energy Watch	Local Governments	27,849	7,401	3,593	-1,788	-2,811	
PGE2133	Fresno County Energy Watch	Local Governments	8,795	2,387	1,129	-566	-891	
PGE2134	Kern County Energy Watch	Local Governments	6,906	1,849	889	-484	-762	
PGE2135	Madera County Energy Watch	Local Governments	665	180	85	-47	-75	
PGE2136	Marin County Energy Watch	Local Governments	2,740	726	354	-140	-221	
PGE2137	Mendocino County Energy Watch	Local Governments	314	84	40	-16	-26	
PGE2138	Napa County Energy Watch	Local Governments	1,231	326	159	-52	-82	

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ProgramID	ProgramName	ReportChapter	Electric			Gas		
			CO <sub>2</sub>	NO <sub>x</sub>	PM <sup>10</sup>	CO <sub>2</sub>	NO <sub>x</sub>	NO <sub>x</sub>
PGE2139	Redwood Energy Watch	Local Governments	2,394	632	309	38	61	
PGE2140	San Joaquin County Energy Watch	Local Governments	2,121	574	272	-157	-246	
PGE2141	San Luis Obispo County Energy Watch	Local Governments	2,197	587	283	-143	-225	
PGE2142	San Mateo County Energy Watch	Local Governments	2,948	785	380	-149	-234	
PGE2143	Santa Barbara County Energy Watch	Local Governments	2,002	536	258	-157	-246	
PGE2144	Sierra Nevada Energy Watch	Local Governments	5,389	1,432	695	-376	-591	
PGE2145	Sonoma County Energy Watch	Local Governments	2,156	580	277	82	129	
PGE2146	Silicon Valley Energy Watch	Local Governments	4,587	1,238	589	1,119	1,759	
PGE2147	San Francisco Energy Watch	Local Governments	19,199	5,172	2,469	4,791	7,535	
PGE2176	California New Homes Multifamily	Residential	389	101	50	303	476	
PGE2177	Enhance Time Delay Relay	Residential	807	225	103	-4	-6	
PGE2178	ENERGY STAR Manufactured Homes	Residential	127	36	16	69	109	
PGE2179	Direct Install for Manufactured and Mobile Homes	Residential	3,301	929	419	1,127	1,772	

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ProgramID	ProgramName	ReportChapter	Electric			Gas		
			CO <sub>2</sub>	NO <sub>x</sub>	PM <sup>10</sup>	CO <sub>2</sub>	NO <sub>x</sub>	NO <sub>x</sub>
PGE2181	Air Care Plus	Commercial	24,491	6,902	3,111	3,822	6,010	
PGE2182	Boiler Energy Efficiency Program	Ag / Ind	291	75	38	5,660	8,900	
PGE2183	Comprehensive Retail Energy Management	Commercial	2,037	572	259	-19	-29	
PGE2185	EnergySmart Grocer	Commercial	22,340	5,694	2,913	21	33	
PGE2186	Enhanced Automation Initiative	Commercial	0	0	0	6,885	10,828	
PGE2187	Monitoring-Based Persistence Commissioning	Commercial	2,133	599	271	636	1,001	
PGE2189	Cool Controls Plus	Commercial	8,596	2,419	1,092	358	564	
PGE2190	LodgingSavers	Commercial	8,664	2,382	1,108	108	170	
PGE2191	Medical Building Tune-Up	Commercial	564	159	72	119	188	
PGE2193	School Energy Efficiency	Commercial	3,257	871	420	9,813	15,432	
PGE2194	Energy Fitness Program	Commercial	12,806	3,470	1,644	-619	-973	
PGE2195	Energy Savers	Commercial	4,460	1,168	578	-240	-377	
PGE2196	RightLights	Lighting	20,311	5,417	2,618	-1,964	-3,088	

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ProgramID	ProgramName	ReportChapter	Electric			Gas		
			CO <sub>2</sub>	NO <sub>x</sub>	PM <sup>10</sup>	CO <sub>2</sub>	NO <sub>x</sub>	NO <sub>x</sub>
PGE2197	Small Business Commercial Comprehensive	Commercial	9,861	2,490	1,289	-42	-66	
PGE2198	DCCCP Quest	Commercial	375	107	48	0	0	
PGE2199	Energy-Efficient Parking Garage	Commercial	2,302	569	302	0	0	
PGE2200	Furniture Store Energy Efficiency	Commercial	3,061	828	393	-188	-295	
PGE2201	High Performance Office Lighting	Lighting	1,807	491	232	0	0	
PGE2202	LED Accelerator	Lighting	2,538	690	326	-617	-970	
PGE2204	SmartVent for Energy-Efficient Kitchens	Commercial	1,740	455	225	461	725	
PGE2205	Casino Green	Commercial	1,796	486	231	40	64	
PGE2206	Healthcare Energy Efficiency Program	Commercial	595	168	76	207	325	
PGE2209	Ozone Laundry Energy Efficiency	Commercial	0	0	0	2,238	3,519	
PGE2212	California Preschool Energy Efficiency Program	Commercial	2,254	618	288	-394	-620	
PGE2213	K-12 Private Schools and Colleges Audit Retro	Commercial	1,452	398	186	-100	-157	
PGE2214	EE Entertainment Centers	Commercial	535	150	68	-14	-22	

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ProgramID	ProgramName	ReportChapter	Electric			Gas		
			CO <sub>2</sub>	NO <sub>x</sub>	PM <sup>10</sup>	CO <sub>2</sub>	NO <sub>x</sub>	NO <sub>x</sub>
PGE2220	AIM Compressed Air Efficiency	Ag / Ind	100	26	13	0	0	0
PGE2221	California Wastewater Process Optimization	Ag / Ind	2,832	729	368	0	0	0
PGE2222	Energy Efficiency Services for Oil Production	Ag / Ind	46,030	11,847	5,988	0	0	0
PGE2223	Heavy Industry Energy Efficiency Program	Ag / Ind	22,496	6,037	2,895	19,078	30,003	
PGE2224	Industrial Compressed Air	Ag / Ind	6,352	1,635	826	0	0	0
PGE2225	Refinery Energy Efficiency Program	Ag / Ind	4,589	1,201	594	65,078	102,344	
PGE2227	Cement Production and Distribution Energy Efficiency	Ag / Ind	18	5	2	0	0	0
PGE2228	Industrial Recommissioning Program	Ag / Ind	2,283	588	297	7,528	11,839	
PGE2230	Dairy Energy Efficiency Program	Ag / Ind	1,445	375	188	0	0	0
PGE2231	Industrial Refrigeration Performance Plus	Ag / Ind	3,254	843	423	0	0	0
PGE2232	Light Exchange Program	Ag / Ind	1,995	519	259	0	0	0
PGE2233	Wine Industry Efficiency Solutions	Ag / Ind	3,767	987	488	545	856	
PGE2234	Comprehensive Food Process Audit & Resource Efficiency Pgm	Ag / Ind	1,379	363	178	0	0	0

ProgramID	ProgramName	ReportChapter	Electric			Gas		
			CO <sub>2</sub>	NO <sub>x</sub>	PM <sup>10</sup>	CO <sub>2</sub>	NO <sub>x</sub>	NO <sub>x</sub>
PGE2235	Dairy Industry Resource Advantage Pgm	Ag / Ind	1,258	337	162	-26	-41	
PGE2236	Process Wastewater Treatment EM Pgm for Ag Food Processing	Ag / Ind	1,845	477	240	0	0	
SCE-L-004A	City of Beaumont Energy Leader Partnership	Local Governments	14	4	2	0	0	
SCE-L-004B	City of Long Beach Energy Leader Partnership	Local Governments	381	104	49	0	-1	
SCE-L-004C	City of Redlands Energy Leader Partnership	Local Governments	421	111	54	0	0	
SCE-L-004E	City of Santa Ana Energy Leader Partnership	Local Governments	634	166	82	-29	-49	
SCE-L-004F	City of Simi Valley Energy Leader Partnership	Local Governments	85	23	11	0	0	
SCE-L-004G	City of South Gate Energy Leader Partnership	Local Governments	143	36	19	0	0	
SCE-L-004H	Community Energy Leader Partnership	Local Governments	3,087	794	402	-2	-3	
SCE-L-004I	Desert Cities Energy Leader Partnership	Local Governments	855	241	109	0	-1	
SCE-L-004J	Eastern Sierra Energy Leader Partnership	Local Governments	3	1	0	0	0	
SCE-L-004M	Orange County Cities Energy Leader Partnership	Local Governments	448	125	57	0	0	
SCE-L-004N	Palm Desert Demonstration Partnership	Local Governments	2,721	746	348	-29	-44	

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ProgramID	ProgramName	ReportChapter	Electric			Gas		
			CO <sub>2</sub>	NO <sub>x</sub>	PM <sup>10</sup>	CO <sub>2</sub>	NO <sub>x</sub>	NO <sub>x</sub>
SCE-L-004O	San Gabriel Valley Energy Leader Partnership	Local Governments	2,469	644	320	-1	-1	-1
SCE-L-004P	San Joaquin Valley Energy Leader Partnership	Local Governments	2,347	620	303	-1	-1	-2
SCE-L-004Q	South Bay Energy Leader Partnership	Local Governments	1,103	289	143	-2	-2	-3
SCE-L-004R	South Santa Barbara County Energy Leader Partnership	Local Governments	160	43	20	0	0	-1
SCE-L-004S	Ventura County Energy Leader Partnership	Local Governments	311	82	40	0	0	0
SCE-L-004U	Western Riverside Energy Leader Partnership	Local Governments	331	87	43	0	0	0
SCE-L-005A	California Community Colleges Energy Efficiency Partnership	Commercial	8,818	2,429	1,127	54	54	84
SCE-L-005B	California Department of Corrections and Rehabilitation Energy Efficiency Partnership	Commercial	1,431	382	184	2,982	2,982	4,689
SCE-L-005C	County of Los Angeles Energy Efficiency Partnership	Local Governments	2,248	619	287	-9	-9	-14
SCE-L-005D	County of Riverside Energy Efficiency Partnership	Local Governments	276	74	35	9	9	14
SCE-L-005E	County of San Bernardino Energy Efficiency Partnership	Local Governments	629	171	81	-7	-7	-11
SCE-L-005F	State of California Energy Efficiency Partnership	Commercial	1,419	378	183	-30	-30	-47
SCE-L-005G	UC/CSU Energy Efficiency Partnership	Commercial	14,601	4,021	1,866	1,463	1,463	2,335

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ProgramID	ProgramName	ReportChapter	Electric			Gas		
			CO <sub>2</sub>	NO <sub>x</sub>	PM <sup>10</sup>	CO <sub>2</sub>	NO <sub>x</sub>	NO <sub>x</sub>
SCE-SW-001A	Home Energy Efficiency Survey Program	Residential	20,054	5,288	2,593	-663	-1,026	
SCE-SW-001B	Residential Lighting Incentive Program for Basic CFLs	Lighting	406,193	108,013	52,405	-66,681	-104,954	
SCE-SW-001C	Advanced Consumer Lighting Program	Lighting	220,534	58,296	28,496	-34,799	-55,338	
SCE-SW-001D	Home Energy Efficiency Rebate Program	Residential	17,114	4,609	2,201	25	27	
SCE-SW-001E	Appliance Recycling Program	Residential	69,253	18,065	8,979	-15,473	-25,086	
SCE-SW-001F	Business and Consumer Electronics Program	Residential	36,883	9,789	4,761	-7,923	-12,681	
SCE-SW-001G	Multifamily Energy Efficiency Rebate Program	Residential	23,996	6,237	3,114	-1,953	-3,071	
SCE-SW-001H	Whole House Prescriptive Program	Residential	2	1	0	4	7	
SCE-SW-002B	Calculated Incentives Program	Commercial	84,140	22,674	10,818	0	0	
SCE-SW-002C	Deemed Incentives Program	Commercial	196,942	53,896	25,216	-3,729	-5,870	
SCE-SW-002D	Commercial Direct Install Program	Commercial	177,885	48,520	22,796	4,976	7,807	
SCE-SW-003B	Industrial Calculated Energy Efficiency Program	Ag / Ind	84,466	22,526	10,889	0	0	
SCE-SW-003C	Industrial Deemed Energy Efficiency Program	Ag / Ind	47,622	13,015	6,100	-485	-764	

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ProgramID	ProgramName	ReportChapter	Electric			Gas		
			CO <sub>2</sub>	NO <sub>x</sub>	PM <sup>10</sup>	CO <sub>2</sub>	NO <sub>x</sub>	NO <sub>x</sub>
SCE-SW-004B	Agriculture Calculated Energy Efficiency Program	Ag / Ind	19,310	5,115	2,494	0	0	0
SCE-SW-004C	Agriculture Deemed Energy Efficiency Program	Ag / Ind	2,408	650	309	-59	-96	
SCE-SW-004E	Pump Test Services Program	Ag / Ind	11,161	2,943	1,443	0	0	
SCE-SW-005A	Savings By Design	Commercial	61,854	16,516	7,972	2,268	3,649	
SCE-SW-005B	California Advanced Homes	Residential	1,712	493	216	1,383	2,191	
SCE-SW-007A	Upstream HVAC Equipment Incentive	HVAC	30,053	8,854	3,769	0	0	
SCE-SW-007D	ENERGY STAR Residential Quality Installation Program	HVAC	287	84	36	0	0	
SCE-SW-007E	Residential Quality Maintenance and Commercial Quality Maintenance Development	HVAC	4,284	1,257	538	-2	-3	
SCE-SW-010B	WE&T Connections	WE&T	4,170	1,106	538	-597	-939	
SCE-TP-002	Comprehensive Mobile Home	Residential	8,432	2,238	1,088	-1,168	-1,953	
SCE-TP-003	Comprehensive Home Performance	Residential	113	33	14	66	105	
SCE-TP-006	Healthcare EE Program (HEEP)	Commercial	3,462	944	444	-1	-1	

ProgramID	ProgramName	ReportChapter	Electric			Gas		
			CO <sub>2</sub>	NO <sub>x</sub>	PM <sup>10</sup>	CO <sub>2</sub>	NO <sub>x</sub>	NO <sub>x</sub>
SCE-TP-008	Comprehensive Beverage Manufacturing and Resource Efficiency	Ag / Ind	181	48	23	0	0	0
SCE-TP-010	Data Center Energy Efficiency	Commercial	352	92	46	0	0	0
SCE-TP-012	Lodging EE Program (LEEP)	Commercial	1,559	415	201	0	0	-1
SCE-TP-013	Food & Kindred Products	Commercial	9,269	2,483	1,194	0	0	-1
SCE-TP-014	Primary and Fabricated Metals	Ag / Ind	7,084	1,916	910	0	0	0
SCE-TP-016	Nonmetallic Minerals and Products	Ag / Ind	6,654	1,787	856	0	0	0
SCE-TP-017	Comprehensive Chemical Products	Ag / Ind	193	51	25	-2	-4	-4
SCE-TP-018	Chemical Products Efficiency Program (CPEP)	Ag / Ind	95	25	12	0	0	0
SCE-TP-019	Comprehensive Petroleum Refining	Ag / Ind	277	77	35	0	0	0
SCE-TP-020	Oil Production	Ag / Ind	5,812	1,530	752	0	0	0
SCE-TP-023	Cool Schools	Commercial	57	16	7	0	0	0
SCE-TP-024	Public Pre-Schools, Elementary Schools and High Schools	Commercial	6,290	1,711	807	-309	-497	-497
SCE-TP-025	Retail Energy Action Program (REAP)	Commercial	2,865	771	369	-4	-7	-7

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ProgramID	ProgramName	ReportChapter	Electric			Gas		
			CO <sub>2</sub>	NO <sub>x</sub>	PM <sup>10</sup>	CO <sub>2</sub>	NO <sub>x</sub>	NO <sub>x</sub>
SCE-TP-026	Commercial Utility Building Efficiency (CUBE)	Commercial	975	272	124	0	0	0
SCE-TP-031	Management Affiliates Program (MAP)	Commercial	4,077	1,114	522	-51	-84	-84
SCE-TP-033	Automatic Energy Review for Schools	Commercial	55	15	7	0	0	0
SCE-TP-036	Energy Efficiency for Entertainment Centers	Commercial	2,707	750	345	-104	-166	-166
SCE-TP-037	Private Schools and Colleges Program	Commercial	1,273	346	163	-69	-112	-112
SCE-TP-038	California Preschools Program (CPEEP)	Commercial	1,822	494	234	-21	-33	-33
SCG3601	Local105 - Local Non-Residential BID	Residential	0	0	0	15,070	23,700	23,700
SCG3602	SW-AgA - Calculated	Ag / Ind	0	0	0	3,132	4,925	4,925
SCG3603	SW-AgB - Deemed	Ag / Ind	0	0	0	3,334	5,243	5,243
SCG3607	SW-ComA - Calculated	Commercial	0	0	0	15,917	25,032	25,032
SCG3608	SW-ComB - Deemed	Commercial	0	0	0	15,249	23,982	23,982
SCG3611	SW-IndA - Calculated	Ag / Ind	0	0	0	109,811	172,695	172,695
SCG3612	SW-IndB - Deemed	Ag / Ind	0	0	0	38,939	61,237	61,237

ProgramID	ProgramName	ReportChapter	Electric			Gas		
			CO <sub>2</sub>	NO <sub>x</sub>	PM <sup>10</sup>	CO <sub>2</sub>	NO <sub>x</sub>	NO <sub>x</sub>
SCG3615	SW-ResA - Multifamily EE Rebates	Residential	7	2	1	4,418	6,949	
SCG3616	SW-ResB - Home Efficiency Rebates	Residential	3,425	946	437	49,846	78,391	
SCG3625	SW-NCNR - NRNC Savings By Design	Commercial	0	0	0	698	1,098	
SCG3626	SW-NCResA - RNC	Residential	1,452	410	184	1,582	2,488	
SCG3664	3P-Res01 - On Demand Efficiency	Residential	7	2	1	5,922	9,313	
SCG3666	3P-Res03 - Multifamily Home Tune-Up	Residential	0	0	0	1,732	2,724	
SCG3667	3P-Res04 - Multifamily Solar Pool Heating	Residential	0	0	0	47	74	
SCG3669	3P-Res06 - Multifamily Direct Therm Savings	Residential	0	0	0	6,772	10,651	
SCG3670	3P-Res07 - LivingWise	Residential	0	0	0	4,576	7,196	
SCG3671	3P-Res09 - Manufactured Mobile Home	Residential	0	0	0	8,588	13,505	
SCG3672	3P-Xc01 - Gas Cooling Retrofit	Commercial	0	0	0	341	537	
SCG3673	3P-Xc02 - SaveGas Hot Water Control	Commercial	0	0	0	2,669	4,197	
SCG3674	3P-Xc03 - Upstream High Efficiency Gas Water Heater	Residential	0	0	0	3,691	5,805	

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ProgramID	ProgramName	ReportChapter	Electric			Gas		
			CO <sub>2</sub>	NO <sub>x</sub>	PM <sup>10</sup>	CO <sub>2</sub>	NO <sub>x</sub>	NO <sub>x</sub>
SDGE3101	SW-AgB - Deemed	Ag / Ind	94	25	12	2,378	3,741	
SDGE3105	SW-ComA - Calculated	Commercial	14,201	3,812	1,828	2,000	3,145	
SDGE3106	SW-ComB - Deemed	Commercial	40,291	10,869	5,179	499	785	
SDGE3109	SW-IndA - Calculated	Ag / Ind	1,724	462	222	511	804	
SDGE3110	SW-IndB - Deemed	Ag / Ind	3,406	925	437	102	161	
SDGE3113	SW-ResA - Residential Basic Lighting	Lighting	67,378	17,983	8,684	-11,168	-17,563	
SDGE3114	SW-ResB - Advanced Consumer Lighting	Lighting	16,343	4,349	2,108	-2,230	-3,507	
SDGE3115	SW-ResG - Business/Consumer Electronics/ Plug Load	Residential	4,435	1,177	573	-958	-1,506	
SDGE3116	Local01 - Local Whole House Performance	Residential	109	30	14	106	166	
SDGE3117	Local03 - Local Non-Residential (BID)	Commercial	56,199	15,121	7,228	6,144	9,663	
SDGE3118	SW-NCNR - NRNC Savings By Design	Commercial	12,596	3,355	1,624	4,839	7,611	
SDGE3119	SW-ResC - Multi-Family	Residential	3,199	849	413	1,621	2,549	
SDGE3121	SW-ResD - Home Efficiency Rebates	Residential	5,384	1,451	692	8,914	14,019	

ProgramID	ProgramName	ReportChapter	Electric			Gas		
			CO <sub>2</sub>	NO <sub>x</sub>	PM <sup>10</sup>	CO <sub>2</sub>	NO <sub>x</sub>	NO <sub>x</sub>
SDGE3137	Local02 - Local Island Program	Commercial	93	25	12	0	0	0
SDGE3160	SW-NCResA - RNC	Residential	364	100	47	463	728	
SDGE3161	3P-NRes01 - Non-Res HVAC Tune-up/ Quality Installa	HVAC	9,659	2,622	1,239	-30	-48	
SDGE3162	3P-NRes02 - SaveGas Hot Water Control	Commercial	0	0	0	860	1,352	
SDGE3167	3P-NRes09 - Mobile Energy Clinic (MEC)	Commercial	4,750	1,314	606	458	720	
SDGE3170	3P-NRes13 - Retro Commissioning (RCx)	Commercial	1,134	308	145	137	216	
SDGE3171	3P-Res01 - Res HVAC Tune-up/Quality Installation	HVAC	1,806	514	229	195	307	
SDGE3172	3P-Res02 - Comprehensive Mobile Home (SW)	Residential	2,269	601	293	612	963	
SDGE3174	SW-ComE - Direct Install	Commercial	8,407	2,296	1,077	-982	-1,545	
SDGE3175	SW-ResF - Appliance Recycling	Residential	16,141	4,195	2,095	-189	-297	



## Appendix E — IOU-Reported Energy Savings by County

The reported energy savings included in this report are limited to activities pursued by the investor-owned utilities in their service territories and were found throughout the state. The following graphics illustrate the relative savings that occurred in the 58 California counties; the accompanying tables show the 20 counties that achieved the most significant first year reported savings. (Note that Reported Savings are “gross”.)

County	Reported First Year kWh
LOS ANGELES	1,250,110,416
ORANGE	516,366,807
SAN BERNARDINO	502,563,527
SAN DIEGO	463,306,373
RIVERSIDE	299,839,158
SANTA CLARA	243,384,495
KERN	226,893,943
ALAMEDA	164,421,971
VENTURA	141,587,805
FRESNO	117,634,722
TULARE	99,973,507
CONTRA COSTA	86,639,736
SAN FRANCISCO	85,439,431
SAN JOAQUIN	81,197,052
SANTA BARBARA	66,113,711

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County	Ex Ante First Year Gross_kW	County	Ex Ante First Year Gross_Therms
LOS ANGELES	235,097	CONTRA COSTA	24,789,723
ORANGE	99,086	LOS ANGELES	15,744,171
SAN BERNARDINO	97,555	SOLANO	13,626,116
SAN DIEGO	81,639	SANTA CLARA	4,632,243
RIVERSIDE	62,563	SAN BERNARDINO	4,352,506
SANTA CLARA	40,948	SAN DIEGO	2,418,277
KERN	37,845	FRESNO	2,390,043
ALAMEDA	32,832	ALAMEDA	2,385,296
VENTURA	26,606	KERN	2,226,741
FRESNO	24,618	SAN FRANCISCO	2,159,592
SAN JOAQUIN	22,586	MONTEREY	1,780,690
TULARE	18,105	STANISLAUS	1,728,780
CONTRA COSTA	16,897	SAN MATEO	1,545,043
SAN FRANCISCO	15,852	SAN JOAQUIN	1,489,887
SAN MATEO	12,270	RIVERSIDE	1,383,227

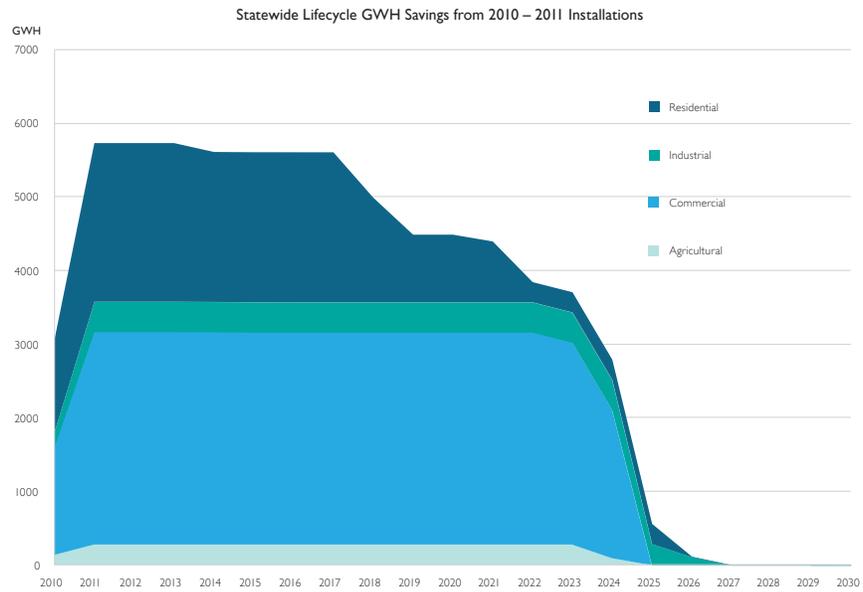
## Appendix F — Statewide Portfolio and IOU Program Lifecycle Savings, 2010 – 2029

The impacts from the 2010 – 2012 program cycle will have lasting effects for several years to come. The potential for long term impacts from any given program cycle is dependent on the investments in measures that offer long term savings. The estimated savings in each year through 2029 are presented by market sector to illustrate these impacts by market sector, statewide and IOU. Lifecycle savings impacts from the 2010 – 2011 program years are modeled based on the energy savings estimates made available during the program cycle and multiplied by the expected useful lives of the installed technologies. The estimates of lifecycle savings impacts, however, are not a comprehensive picture of the expected savings over time, as energy savings technologies installed during the 2010 – 2011 program years may be affected by changes in economic activity (affecting production rates) and/or early expiration of technologies due to either remodeling or technology failures. These

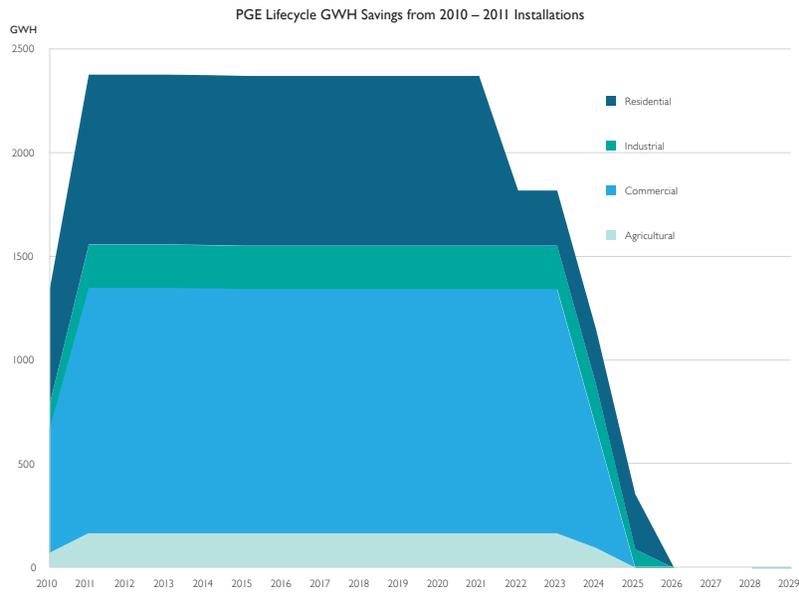
estimates also do not take into consideration the potential for declining savings from aged equipment. Nevertheless, the estimates present the long-term potential impacts of the specific measures installed in 2010 – 2011. No consideration of the long term influence of the programs on market factors is included.

The savings that are first achieved in 2010 – 2011 and persist from one year to the next over the lifecycle are presented in the graphics in this section. The intent is to illustrate how the installed measures will likely expire in the future and how this effect is different for each market sector. Figures 1 – 7 present the lifecycle savings from the 2010 – 2011 program years. The savings that persist from the 2004 – 2005 and 2006 – 2008 program cycles are not included in this graphic, nor are savings projected for future energy efficiency programs.

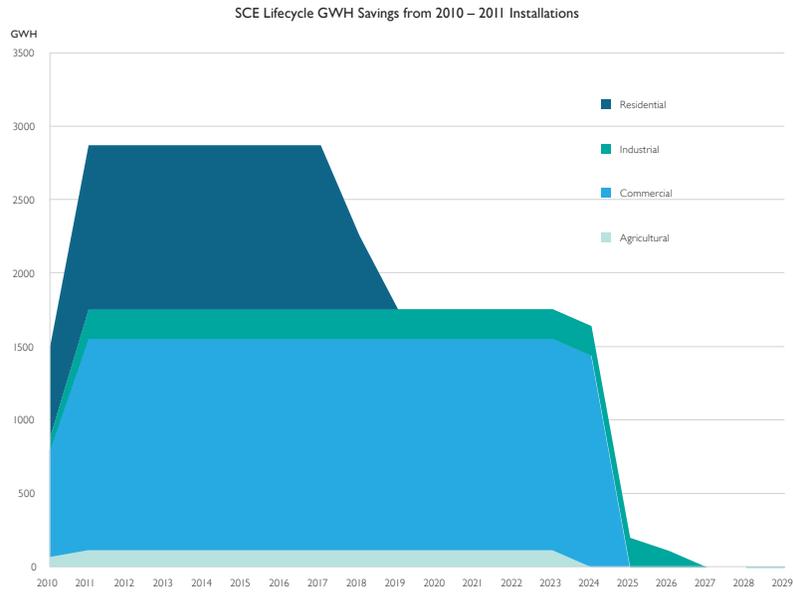
**Figure 1.** Statewide Lifecycle GWh Savings



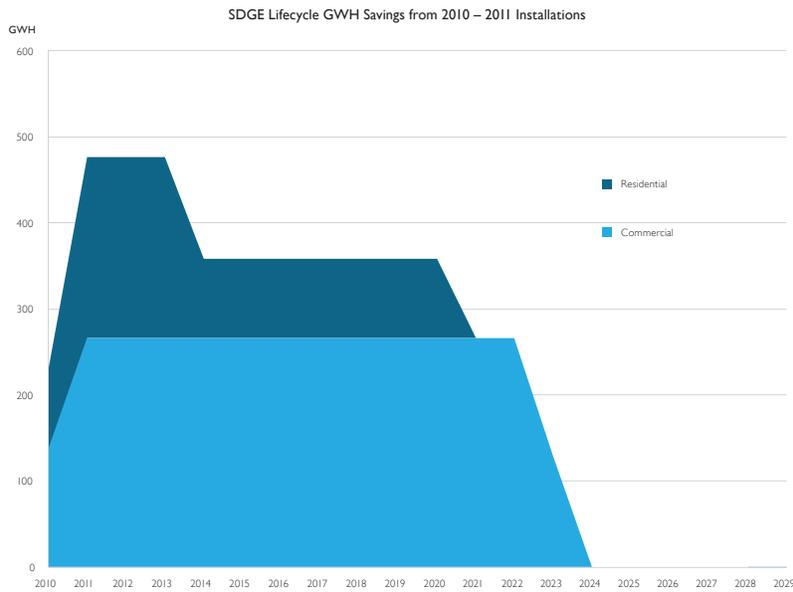
**Figure 2.** PGE Lifecycle GWh Savings



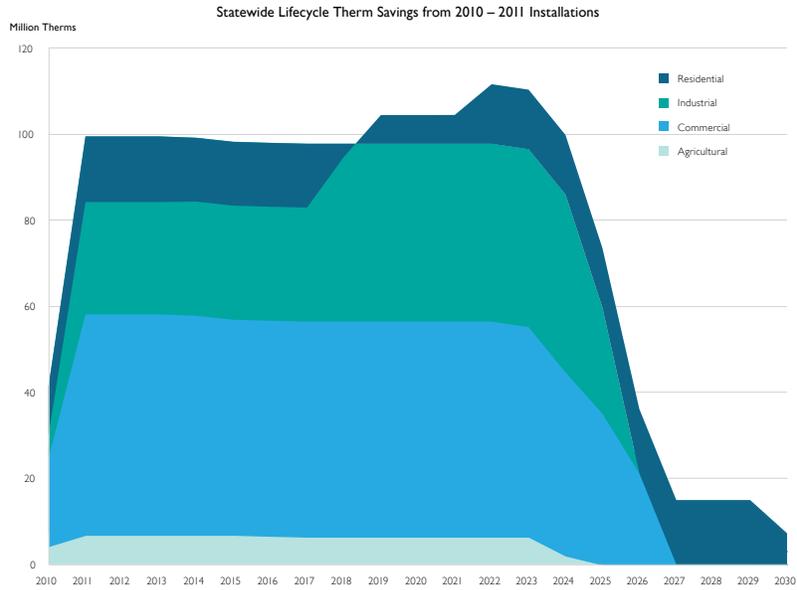
**Figure 3. SCE Lifecycle GWh Savings**



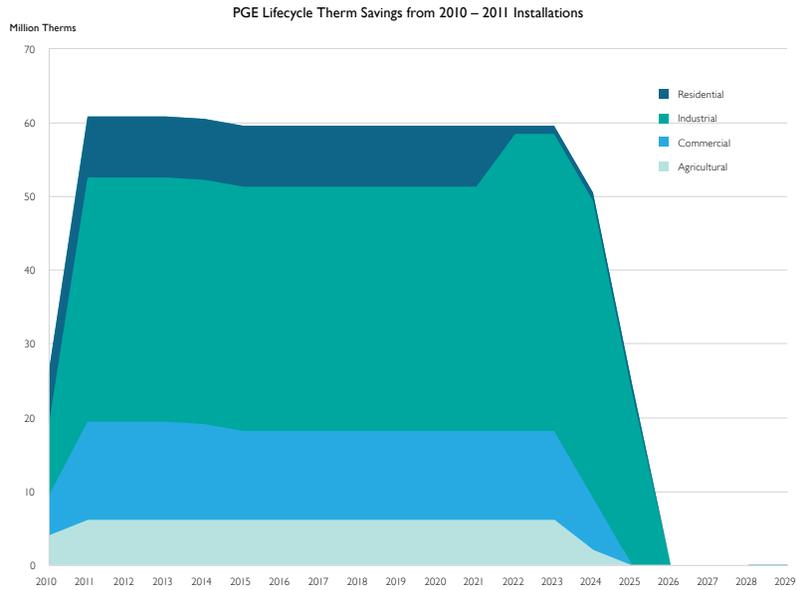
**Figure 4. SDGE Lifecycle GWh Savings**



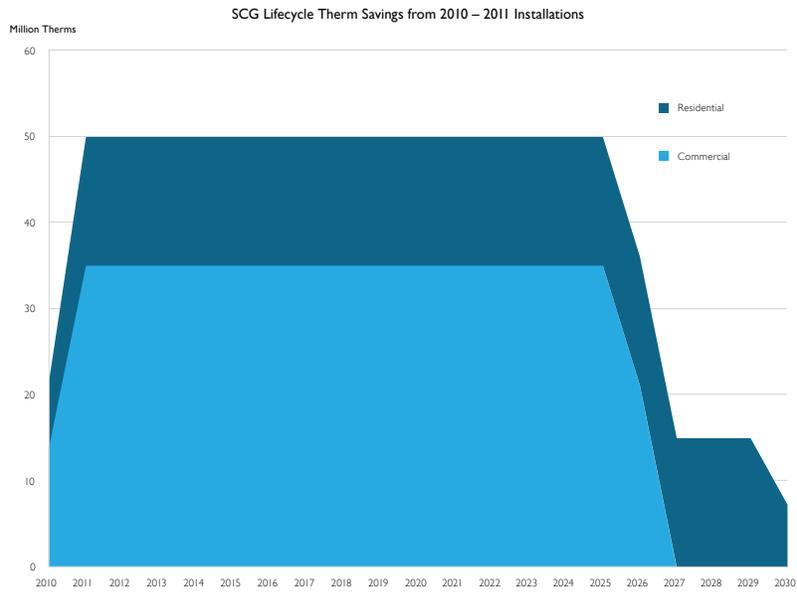
**Figure 5.** Statewide Lifecycle Therm Saving



**Figure 6.** PGE Lifecycle Therm Savings



**Figure 7.** SCG Lifecycle Therm Savings





## Appendix G — Energy Division and IOU Evaluation Studies, 2010 – 2012

For the 2010 – 2012 program cycle, the following studies represent the evaluation work funded through 2010 – 2012 EM&V. Impact Evaluations are solely managed by Energy Division, while Market and Process studies may be managed by either Energy Division or the IOUs.

A complete list of on-going and completed studies funded through the 2010 – 2012 program cycle can be found on Energy Division's Project Status Reporting website: <http://websafe.kemainc.com/Projects/Default.aspx?tabid=1068>

Sector	Study Name
Commercial	I020 - Process Evaluation of Nonresidential Retrofit Programs
	I021 - Omnibus Statewide Nonresidential Process Evaluation
	I024 - Cleanroom, Lab and Data Center Baseline Study
	I025 - SDG&E Nonresidential Process Evaluation
	I026 - Energy Savings Calculation Tools Development for Existing Building Commissioning (EBCx) Program
	I037 - Nonresidential New Construction Process Evaluation and Market Characterization (NRNC/ Statewide Savings by Design Program Process Evaluation )
	I056 - SCG Nonresidential Process Evaluation
	I057 - Nonresidential New Construction Process Evaluation and Market Characterization (NRNC/ Savings by Design Marketing Characterization Study, Phase II )
	I058 - 2011 Data Center Baseline
	I059 - Local Government Partnerships Process Evaluation
	I061 - Nonresidential Omnibus Research 19.1

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Sector	Study Name
	Commercial Saturation Survey/CMST
	HVAC Programs Process Evaluation and Market Characterization
	Nonres Downstream Lighting
	Overarching Process Evaluation of All Nonresidential Programs
	Residential and Small Com HVAC
Cross-Cutting	I015 - Basic/Advanced/Lighting Market Transformation Program Evaluation & Residential/Non-Residential Lighting Customer Needs/Decision Characterization
	I016 - Statewide Advanced Lighting Baseline Study
	I017 - SCE/PG&E LMT Lighting Technology Roadmap
	I018 - LED Market Trial Study (funded by program team)
	I022 - PG&E LGP Innovator Pilot Evaluability Assessment
	I027 - Early EM&V Research for All Programs
	I033 - Building/Facility Renovation/Remodel Rates Study
	I034 - ACEEE Evaluation Methods Review Study
	I035 - Statewide Workforce Education & Training Process Evaluation
	I036 - SCE's Catalina Island Program Improvement Assessment
	I038 - Statewide Process Evaluation of C&S Program
	I039 - ZNE Market and Process Assessment
	I040 - ZNE Pilot Program "Roadmap to Zero Net Energy Residential & Commercial New Construction in California"

Sector	Study Name
	I041 - Phase II HVAC Maintenance Study Behavioral Research
	I042 - SCE's Enhanced Inspection Study
	I043 - ME&O Process Evaluation
	I045 - ZNE Pilot Program "Assessment of the Technical Potential for Achieving Zero Net Energy Buildings in the Commercial and Residential Sectors in California"
	I048 - Barriers to ZNE for Master Planned Projects
	I050 - C&S Code Change Theory Reports Title 24
	I051 - C&S Code Change Theory Reports Title 20/Federal Rulemaking
	I052 - C&S Incremental Measure Cost Assessment
	I053 - C&S Data Dictionary Implementation
	I060 - IDSM Program Process Evaluation
	I063 - ETP Technology Market Actors Characterization Study
	Audit Programs Evaluation
	C&S, NC and ZNE Market Assessment and Process Evaluation: ED Oversight of IOU-Managed Projects
	Codes and Standards
	Data Management and Analysis
	ETP Process Evaluation and Market Assessment
	HVAC Interactive Effects
	Macro Consumption White Papers/Pilots

## Appendix G | 2010 – 2011 Energy Efficiency Evaluation Report

Sector	Study Name
	Market Effects and Transformation Research
	Measure Cost Study
	Omnibus IDSM Program Process Evaluation
	Other Non-Resource Program Impact Evaluation
	Pilot Program Evaluations
	Portfolio Strategy and Management Assessment
	Potential & Goals
Ind/Ag	I023 - Statewide Process Eval of CEI and RCx programs
	I028 - SCE Industry Standard Practice Research
	I029 - Agricultural Pumping Early M&V
	I030 - Industrial Sector Market Characterization Study
	I031 - Industrial End Use Saturation Study (IEUS, pre 2010 – 2012)
	I032 - Agricultural Potential and Market Characterization Study
	Custom Measures
Residential	I000 - Process Evaluation of Home Energy Reports (Neighbor Comparisons) Initiative Tests (Initial and Ongoing)
	I001 - ARP Process Evaluation & Market Characterization
	I002 - ARP Retailer Trial - SCE
	I003 - ARP Retailer Trial - PG&E

Sector	Study Name
	I004 - PG&E/SCE HEES/CLEO & OBG process evaluation
	I005 - PG&E/SCE MFEER & CMHP process evaluation
	I006 - PG&E/SCE Whole House Early M&E, evaluability & process evaluation
	I007 - Moderate Income Direct Install (MIDI) Program Process Evaluation
	I008 - SCE/PG&E BCE & HEER Process Evaluation, Market Characterization & Residential General Population Survey for Homeowners/Renters
	I009 - SCE/PG&E AKA Whitepaper
	I010 - SDG&E Residential Process Evaluation
	I011 - 2011 Nat'l Energy Star Label Household Awareness Survey
	I012 - Residential Appliance Saturation Survey (RASS) Oversample
	I013 - Residential New Construction - California Advanced Home Program (CAHP) Process study
	I014 - Multi-family New Construction Market Characterization Study
	I019 - Consumer Preference Research to Support Lighting Programs
	I044 - PG&E Whole House Early M&E, evaluability & process evaluation
	I046 - Residential New Construction Customer Decision Study
	I047 - RNC Measure Optimization Tool Update
	I049 - Manufactured Housing Energy Star Baseline Study and Market Assessment
	I054 - SCG Residential Process Evaluation
	I055 - Residential New Construction - California Advanced Home Program (CAHP) Customer Decision Study

## Appendix G | 2010 – 2011 Energy Efficiency Evaluation Report

Sector	Study Name
	I062 - Market Research of Builder's Selling Practices and Strategies for Energy Efficient Homes
	Consumer Electronics and Plug Load
	Evaluation of PG&E's OPOWER Pilot Program
	Lighting Programs Process Evaluation and Market Characterization
	Overarching Process Evaluation of All Residential Programs
	Res Appliance Recycle Refrigerator and Freezer
	Res Whole Building - Retrofit
	Residential Market Share Tracking
	Residential On-Site/Metering Survey
	Residential/Advanced/Upstream Lighting

## Appendix H — Energy Division Suite of Evaluation Tools

Although this report describes IOU-reported savings estimates and evaluated savings will not be presented until July 2013, the IOU-reported savings were run through the same suite of tools in order verify data accuracy.

In order to provide measure specific estimates of savings and the ability to update key parameters in the utility reported savings for these measures as filed with the Commission, Energy Division developed a suite of tools and processes to:

- Standardize the tracking data submitted from each of the IOUs;
- Match the tracking data to the savings and costs reported to the Commission;
- Update the utility reported savings parameters from the detailed program tracking with evaluated results; and
- Produce aggregate impacts by utility, program or technology.

In addition, the ability to aggregate evaluation results in a centralized system allows for measure specific evaluation designs to cut across programs to increase sample size and for the results to be pulled together at the program level in the centralized database. The resultant data set has the multiple benefits of providing estimates of savings, benefits, and costs for each IOU or the four IOUs combined, for specific programs, and for technologies.

The Evaluation Reporting Tools (ERT) is the suite of tools and processes that work in concert to produce estimated IOU-reported savings results of the 2010 – 2011 energy efficiency portfolio. The ERT was initially developed for the 2006-2008 program cycle evaluation through the collaborative work of several technical advisors, professional programmers, and evaluation consultants (the ERT Team). The three core components of the ERT are: 1) The E3 Calculator engine, 2) The Standardized Program Tracking Database, and 3) The ERT Application.

### E3 Calculator

The E3 calculator is the official CPUC EE program cost-effectiveness tool used to calculate utility energy savings and total net benefits for energy efficiency programs and portfolio. The E3 calculator determines cost effectiveness (using the Total Resource Cost test), avoided costs and benefits, and additional data that is not present in IOU program tracking data such as ex-ante load shapes, ex-ante effective useful life (EUL), and ex-ante net-to-gross (NTGR).

### Standardized Program Tracking database (SPTdb)

The Standardized Program Tracking Database (SPTdb) is an MS Access™ database designed by Energy Division and its consultants to bring all IOU program tracking data together into a single, standardized table. There is an SPTdb .mdb file for each

utility. This software tool allowed Energy Division to produce aggregate impacts by utility, program or technology.

### ERT Application

The ERT Application is an MS Access™ database that is designed to accept measure level evaluated results, process those results through the appropriate E3 engine, and aggregate the processed results. For the purposes of this report, the measure level results are IOU-reported and not evaluated.