

# CALIFORNIA RESTORES ITS ENERGY EFFICIENCY LEADERSHIP

Smart Policies Provide Enormous  
Economic and Environmental Benefits

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*This paper is dedicated to Dr. Arthur Rosenfeld, recently retired member of the California Energy Commission, whose visionary leadership in the field of energy efficiency has inspired new generations to follow in his footsteps.*

## SUMMARY

Remarkable advances in California's energy efficiency programs over the last decade have yielded enormous economic and environmental benefits. Efficiency programs provided nearly \$5 *billion* in net benefits to customers statewide over the last decade alone.<sup>1</sup> New programs planned over the next three years are expected to provide even greater savings to consumers while creating more than 15,000 skilled green jobs.<sup>2</sup> In 2008, the pollution savings from efficiency programs (which have accumulated since the state first began programs in earnest in the mid-1970s) totaled nearly 1,000 tons of smog-forming nitrogen-oxides<sup>3</sup> and provided global warming pollution savings equivalent to the emissions from approximately 3 million cars.<sup>4</sup>

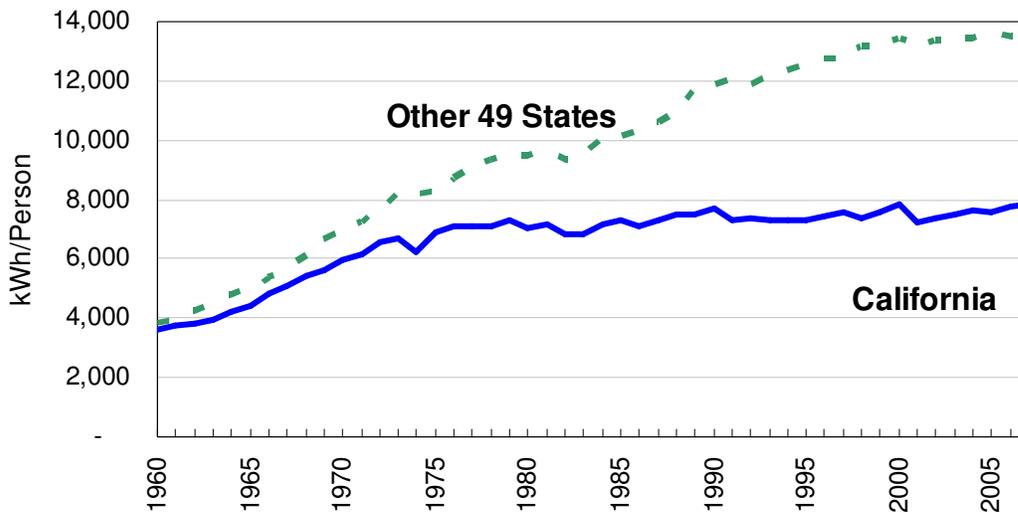
California adopted a suite of smart policies over the last decade, which spurred a significant increase in savings from efficiency programs:

- The net benefits consumers reaped from efficiency increased nearly *five-fold* from 1998 to 2008 (from about \$185 million to almost \$900 million).<sup>5</sup>
- Energy savings increased almost *six-fold*, from 582 GWh in 1998 to 3,414 GWh in 2008 (savings in 2008 were equivalent to the electricity consumed by approximately 460,000 households every year – or more than all the households in San Francisco and San Mateo counties consume each year).<sup>6</sup>
- These gains were the result of a nearly *five-fold* increase in annual investments (from about \$210 million in 1998 to \$1.04 *billion* in 2008).<sup>7</sup>

The programs continued to provide the cheapest, cleanest resource available to meet California's energy needs, costing less than 3 ¢/kWh, or less than *half* the California Public Utilities Commission's (CPUC) recent benchmark for baseload power.<sup>8</sup> Additional programs targeted specifically to help lower-income households improve their efficiency and lower their energy bills reached more than 1.6 million households over the last decade, or more than 40% of all eligible participants.<sup>9</sup>

The state's recent success with energy efficiency (EE) programs builds on decades of progress that helped California keep per capita electricity consumption nearly flat over the last 30 years, while the rest of the nation increased by over 50 percent (see Figure 1). This remarkable achievement is commonly known as the "Rosenfeld Curve," after Dr. Arthur Rosenfeld, one of the "fathers" of energy efficiency and recently retired member of the California Energy Commission (CEC).<sup>10</sup> While some of the difference between California and national per capita consumption may be explained by factors that are independent of energy policy, such as industry composition and average household size,<sup>11</sup> at least one-quarter of this progress was based on the state's integrated effort to advance research, development and demonstration (RD&D) of more efficient technologies and processes through the Public Interest Energy Research (PIER) program, utility investments in efficiency programs that help consumers use those efficient technologies to lower their utility bills, and minimum efficiency standards for buildings and appliances that lock in the savings.<sup>12</sup>

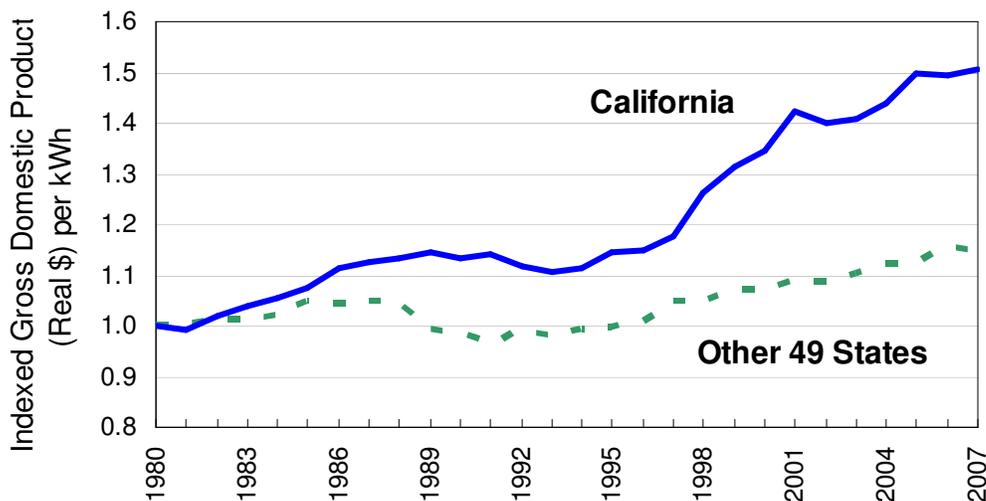
**Figure 1: Per Capita Electricity Consumption<sup>13</sup>**



California is once again recognized as the nationwide leader on energy efficiency.<sup>14</sup> The state routinely ranks at the top of national assessments of energy efficiency performance; for example, the American Council for an Energy-Efficient Economy (ACEEE) ranked California number 1 in two recent studies based on expert ratings and quantitative analysis of state efficiency data.<sup>15</sup>

The benefits of the state’s efficiency policies are readily apparent. They have played an important role in making the state’s cost of electricity the fifth lowest in the country, measured as a fraction of GDP.<sup>16</sup> Although residential electricity rates are somewhat higher than average, consumers’ electric *bills* – what they really care about – are 16% below the national average.<sup>17</sup> In addition, the inflation-adjusted economic productivity of the state’s electricity use has improved about 50% since 1980, while the rest of the nation has improved only 15% (see Figure 2).<sup>18</sup> In 2007, California produced \$5.4 million of GDP for every GWh of electricity consumed, while the average for the other 49 states was only \$2.7 million per GWh.<sup>19</sup>

**Figure 2: Economic Productivity of Electricity Use<sup>20</sup>**



California has made remarkable progress, but there is no time for the state to rest on its laurels. Recent analyses show the state can capture approximately 7,000 MW and nearly 29,000 GWh of additional efficiency savings through 2020, continuing to save energy more cheaply than it can be produced.<sup>21</sup> Capturing these savings is becoming even more important as the state seeks to jump-start the economy, continue improvements in air quality, and curb global warming.

Efficiency is a proven tool to create jobs and to enable consumers to keep more money in their pockets by paying less on their utility bills. The Air Resources Board has also recognized it as one of the key strategies to meet the state's AB 32 global warming pollution limit while also cutting air pollution.<sup>22</sup> And with Congress poised to enact a nationwide limit on global warming pollution, California is well-served to get a head-start.

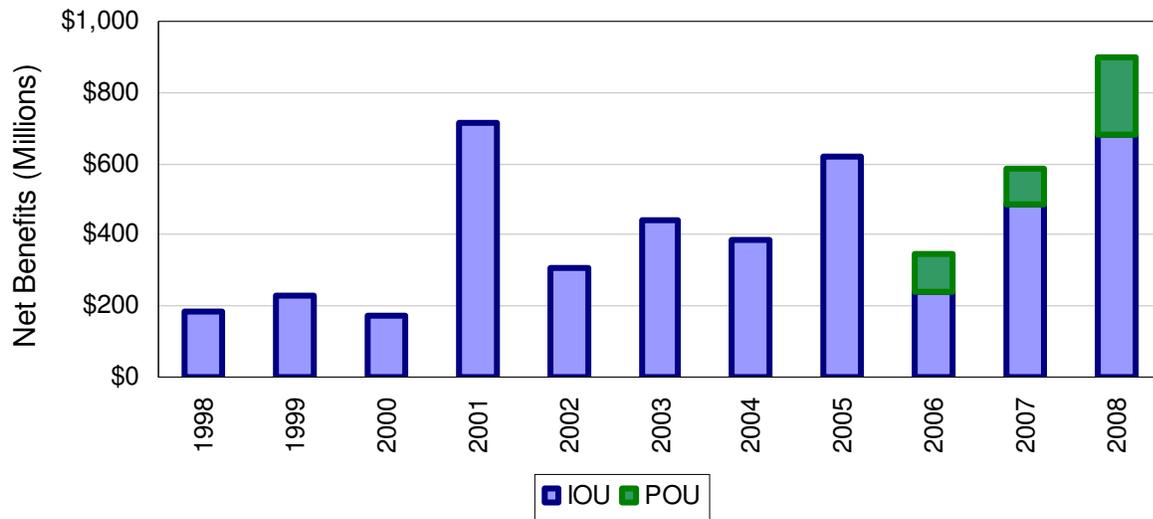
California's efficiency success is based on an integrated effort to advance RD&D, utility investments in efficiency programs, and minimum efficiency standards for buildings and appliances. This report examines the status of California's energy efficiency *programs*, which are one key element of that integrated effort.

## **EFFICIENCY CREATES JOBS AND SIGNIFICANT BENEFITS FOR CONSUMERS**

California's investments in energy efficiency provide enormous benefits, which are magnified as households reinvest their savings into the state's economy. A recent U.C. Berkeley analysis of the state's overall energy efficiency efforts (including codes and standards) found that California's energy efficiency investments from 1972 to 2006 provided a cumulative total of about \$56 billion in savings and created about 1.5 million full-time equivalent jobs with a payroll of \$45 billion.<sup>23</sup> For every new job foregone in the fossil fuel sectors from investments in efficiency, more than 50 new jobs are created across the economy.<sup>24</sup>

Efficiency programs alone have provided customers nearly \$5 *billion* in net benefits over just the last decade. In other words, the combined investor-owned utility (IOU) and publicly-owned utility (POU) programs saved nearly \$5 billion (from avoided generation, natural gas, transmission and distribution) above and beyond what they cost. The net benefits to customers increased nearly *five-fold* in the last decade, as illustrated in Figure 3.<sup>25</sup> The IOUs' new programs planned for the next three years, guided by the CPUC's "California Long Term Energy Efficiency Strategic Plan," are expected to provide even more savings to consumers while creating more than 15,000 skilled green jobs.<sup>26</sup>

**Figure 3: Net Benefits from Utility Efficiency Programs<sup>27</sup>**



Note: Comprehensive data on POU efficiency savings is only available beginning in 2006; however, many POUs have offered programs for decades. IOU net benefits include savings from both electricity and natural gas efficiency programs; however, most POUs only provide electricity service. IOUs provide approximately 75% of the state's electricity and POUs provide approximately 25%.<sup>28</sup>

Efficiency programs provide such large benefits to consumers because energy efficiency is the cheapest resource available to meet utility customers' energy service needs. Over the last 3 years, the programs continued to provide savings for less than 3 ¢/kWh.<sup>29</sup> This price is less than half the cost of the baseload power it replaces (based on the CPUC's recent estimate of more than 8 ¢/kWh for baseload energy fueled by natural gas).<sup>30</sup>

## **EFFICIENCY HELPS MAKE ENERGY AFFORDABLE FOR LOW-INCOME CONSUMERS**

Energy efficiency is a critical tool to help make the energy services that we all rely upon, such as heating, lighting, and cooking, more affordable for lower-income families. Utilities around the state have programs geared specifically to the needs of low-income households, supplementing the approximately \$89 million in annual federal Low-Income Home Energy Assistance Program weatherization and bill payment assistance administered by the California Department of Community Services and Development.<sup>31</sup> The IOUs' programs provide free energy efficiency upgrades, such as weatherization and efficient refrigerators to qualifying households, who save on average more than \$400 during the life of the efficiency upgrades.<sup>32</sup> Qualification is based on income; for example, a four-person household with annual income less than \$43,200 can participate in these programs.<sup>33</sup> The CPUC has authorized the IOUs to invest nearly \$880 million from 2009-2011 to improve energy efficiency in low-income households alone.<sup>34</sup> Over the last decade, their programs served about 1.6 million low-income households, or about 42% of all eligible participants.<sup>35</sup>

Utilities also offer various bill payment assistance programs to lower-income households. For example, the CPUC approved a \$2.6 billion budget for the IOUs' bill payment assistance program for 2009-2011.<sup>36</sup> The low-income efficiency programs provide the dual benefit of immediately

lowering participating customers' bills and reducing the amount other utility customers spend to fund the bill payment assistance programs. These programs all recognize that consumers care more about affordable energy *bills* than the *rate* they pay for each kWh or therm of energy. Energy efficiency continues to be the most powerful way to make energy bills more affordable for low-income families.

## **EFFICIENCY CUTS AIR POLLUTION AND GLOBAL WARMING POLLUTION**

Efficiency programs also provide significant environmental benefits, including cleaner air and less global warming pollution. These benefits are critical as California seeks to cure its air pollution problem, being home to 9 of the 10 smoggiest counties in the United States, and to lead the way to curb global warming.<sup>37</sup>

The pollution savings from efficiency have grown over time since the state first began efficiency programs in the mid-1970s; in 2008, the air pollution reductions totaled nearly 1,000 tons of smog-forming nitrogen-oxides (equivalent to the pollution from over 200,000 cars),<sup>38</sup> which provide valuable health benefits in the form of avoided lung disease, respiratory hospital admissions, and emergency room visits.<sup>39</sup>

The Air Resources Board has also recognized efficiency as one of the key strategies to meet the state's AB 32 global warming pollution limit.<sup>40</sup> By 2008, the cumulative annual savings from California's energy efficiency programs alone since 1978 was in the range of 10 to 15 million metric tons of CO<sub>2</sub> equivalent (MMTCO<sub>2</sub>e) per year.<sup>41</sup> (This is equivalent to the global warming pollution from approximately 2 to 3 million cars.<sup>42</sup>) In other words, without these energy efficiency programs, California's greenhouse gas emissions would have been 10 to 15 MMTCO<sub>2</sub>e higher in 2008 than they actually were.<sup>43</sup> The Air Resources Board is expecting to get an additional approximately 16 MMTCO<sub>2</sub>e of savings from energy efficiency (both programs and building and appliance efficiency standards) by 2020.<sup>44</sup> These efficiency savings provide by far the cheapest significant greenhouse gas reductions in the utility sectors.<sup>45</sup>

## **THE RIGHT POLICIES ARE ESSENTIAL FOR SUCCESS**

California's experience with energy efficiency is a textbook example of how important the right policies are for progress. Figure 4 shows California's experience: when policies align utility incentives and customer interests, savings rise. When these policies are removed, savings drop.

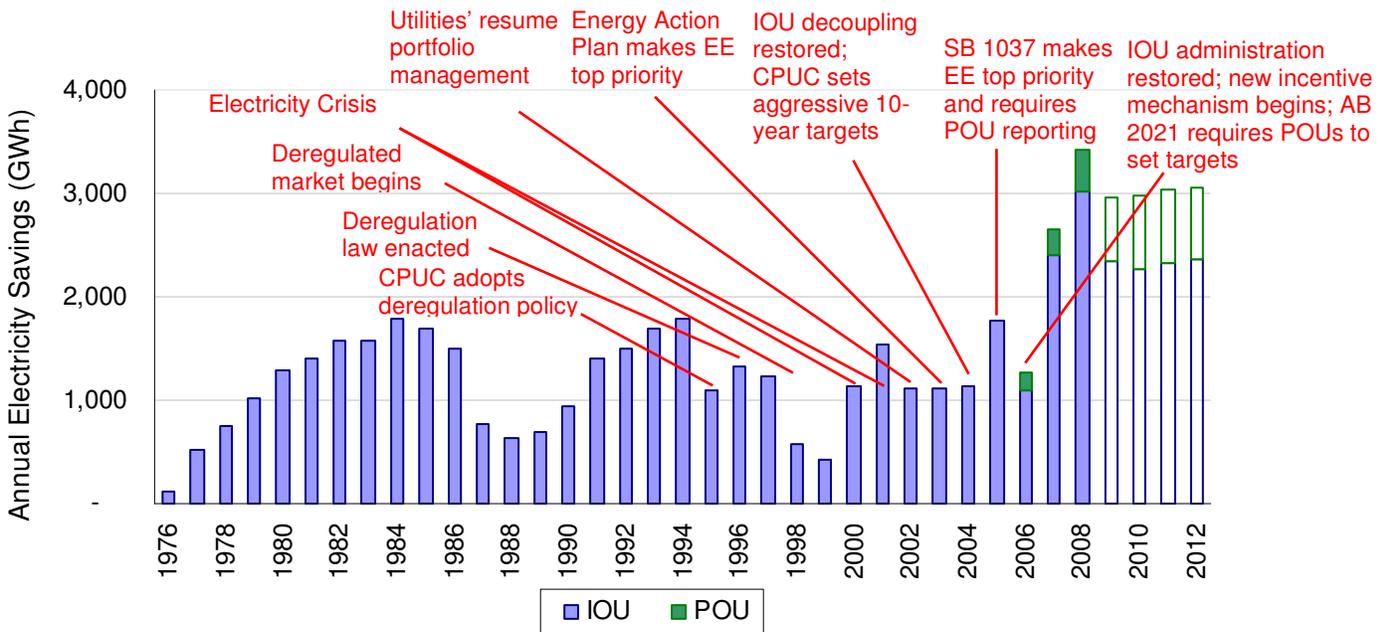
By the early 1990s, California had adopted a package of policies to encourage energy efficiency and savings began to rise; however, the state soon changed course dramatically, adopting its now-infamous deregulation law in 1996.<sup>46</sup> As it became clear the state was going to deregulate and eliminate most of the policies encouraging efficiency, savings dropped sharply. During the ensuing electricity crisis of 2000 and 2001, an emergency conservation and efficiency effort yielded impressive results, thanks in large part to the infrastructure of contractors and program implementers built over the prior decade.

In the aftermath of the crisis, the state began reassembling the policies necessary to support energy efficiency. The state made energy efficiency the top priority resource and reintegrated it into the IOUs' resource procurement, set aggressive energy and demand saving targets, broke the

link between the IOUs' recovery of authorized fixed costs and the volume of energy they sell to remove powerful disincentives (also known as "decoupling" policies), and created a performance-based incentive to reward excellent performance and penalize poor performance.

Step by step, the state adopted this suite of policies and energy efficiency flourished again. The results are impressive. In 2008, the IOUs' energy savings were more than five times greater than a decade ago and far surpassed even the levels achieved from the historic effort during the electricity crisis. Three years ago, California began to implement similar policies for the POUs for the first time.<sup>47</sup> Many POUs have offered efficiency programs for decades, but the new policies have had an immediate impact; in just three years, POUs more than doubled their reported energy savings.

**Figure 4: Annual Electricity Savings From California Utility Efficiency Programs<sup>48</sup>**



Note: Comprehensive data on POU efficiency savings is only available beginning in 2006; however, many POUs have offered programs for decades. IOUs provide approximately 75% of the state's electricity and POUs provide approximately 25%.<sup>49</sup>

The savings from the utilities' efficiency efforts are magnified well beyond the direct savings presented in Figure 4 as a result of their leadership. The programs help transform markets to make efficiency the norm rather than the exception and provide large "spillover" benefits. For example, by helping make efficient products more prominent in stores, many people buy the efficient products without directly participating in utility programs. In addition, the utilities play a critical role in readying the market and making the case for ever tighter state and national efficiency standards, providing greatly magnified savings around the country. To provide just a few recent examples, California utilities played a key role in: (i) path-breaking national lighting efficiency standards adopted by Congress in December 2007 that will cut electricity needs for the nation's four billion screw-in lightbulb sockets by more than 60 percent by 2020; (ii) April 2008 upgrades to California's building efficiency standards that will yield more than 500 MW of cost-effective savings by 2013;<sup>50</sup> and (iii) the first-ever efficiency standards for digital televisions California adopted in November 2009, which will cut consumption 30 to 50 percent from 2007 levels and will save California almost \$1 billion per year on electric bills.

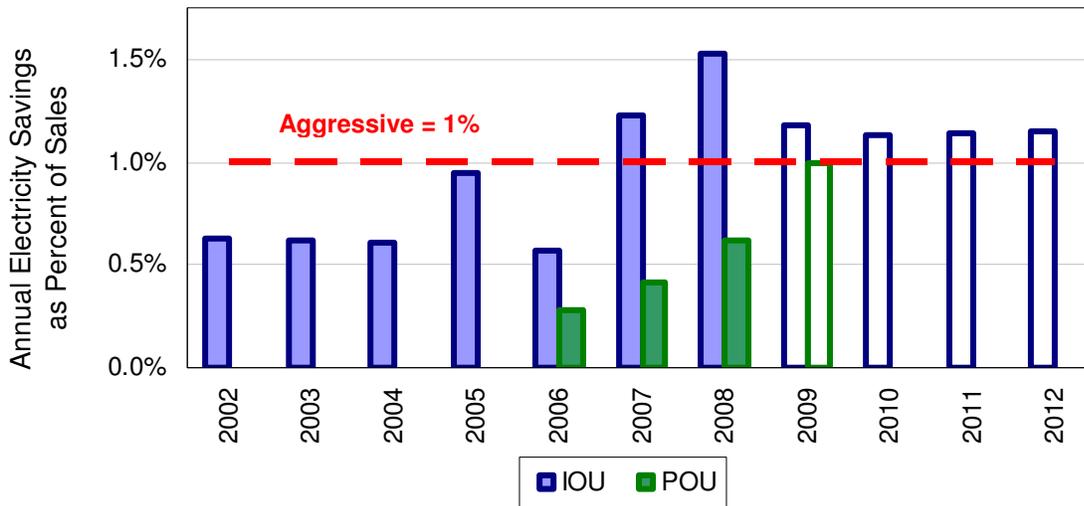
Moreover, California’s efficiency programs and standards have been the model for policies adopted by other countries such as China and Russia, further multiplying the savings. The efficiency programs’ success can also create even more opportunities for advancements in the future. As the programs help today’s state-of-the-art measures achieve strong market shares, they encourage manufacturers and designers to introduce next-generation products and services with even higher levels of efficiency.

## SMART POLICIES DRIVE AGGRESSIVE PROGRAMS

Policies that properly align incentives drive utilities to implement aggressive efficiency programs. The legislature and CPUC have adopted the policies necessary to spur aggressive efficiency programs for the IOUs (as noted in Table 1, below). The result is that they now have truly aggressive programs based on industry-standard efficiency metrics, with annual electric savings exceeding 1% of sales and electric efficiency investments exceeding 2% of revenues.

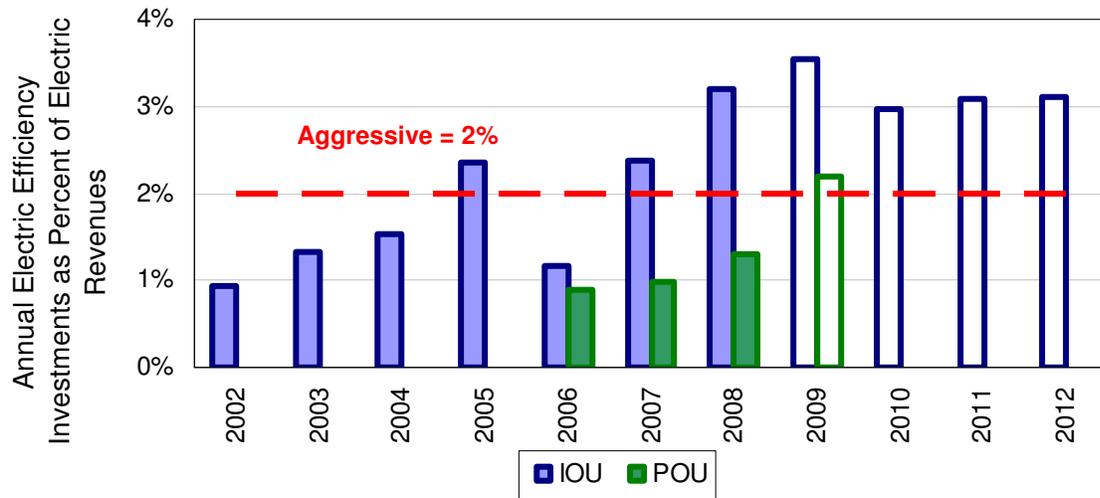
California’s policies to encourage the POUs to capture all cost-effective efficiency savings are at an earlier stage of development, as indicated in Table 1. As a result of recent policy enhancements, the POUs have made significant progress towards achieving aggressive programs, reporting more than doubled annual savings as a percent of sales, in aggregate, over the past three years. However, to be considered truly aggressive, additional policies are still needed and the POUs in aggregate must increase their savings approximately 60% (which they aimed to do last year, but results are not in yet).<sup>51</sup> There are significant differences among the POUs, however, and each individual POU’s situation depends on numerous factors including its size, customer profiles, climate, and local economy.<sup>52</sup>

**Figure 5: Annual Electric Savings as Percent of Sales<sup>53</sup>**



Note: Comprehensive data on POU efficiency savings is only available beginning in 2006; however, many POUs have offered programs for decades.

**Figure 6: Annual Electric EE Investments as Percent of Revenues<sup>54</sup>**



Note: Comprehensive data on POU efficiency savings is only available beginning in 2006; however, many POU's have offered programs for decades.

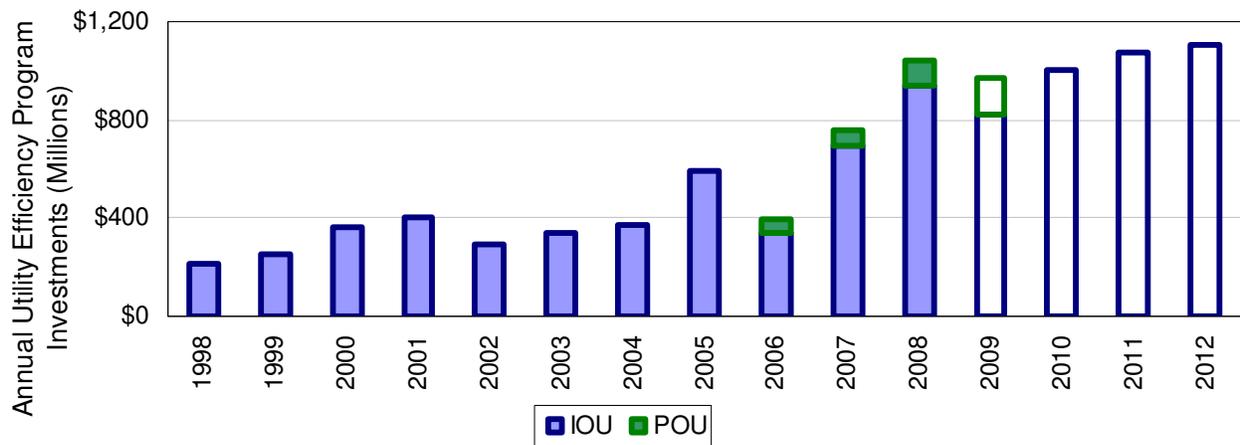
**Table 1: Status of Key Energy Efficiency Policies for California Utilities**

KEY EFFICIENCY POLICIES	IOU	POU
<b>EE as top priority</b>	Yes, SB 1037 (Kehoe, 2005)	Yes, SB 1037 (Kehoe, 2005)
<b>Aggressive targets</b>	Yes, CPUC proceeding in 2010 to update targets through 2020	AB 2021 (Levine, 2006) requires POU's to set targets, CEC process in 2010 to evaluate updated POU targets
<b>Recovery of fixed costs decoupled from sales<sup>55</sup></b>	Yes	No
<b>Cost recovery for program expenses</b>	Yes	Yes
<b>Performance-incentives</b>	Yes, CPUC proceeding underway to improve and extend	N/A <sup>56</sup>
<b>Integration of EE into resource procurement<sup>57</sup></b>	Yes	Only for few POU's
<b>Evaluation, measurement &amp; verification of results</b>	Yes, CPUC proceeding underway to improve	AB 2021 (Levine, 2006) requires, but improvement needed for most POU's
<b>Comprehensive program portfolio<sup>58</sup></b>	Yes	Needs improvement for many POU's
<b>Low-income efficiency programs</b>	Yes	Yes

## EFFICIENCY INVESTMENTS YIELD SAVINGS FOR CONSUMERS

California's efficiency programs have continued to provide more than \$2 in benefits for every \$1 invested.<sup>59</sup> The more aggressive the programs are, the more benefits consumers reap. California's energy efficiency investments have increased from just over \$200 million per year a decade ago to about \$1 billion per year. A recent analysis by Lawrence Berkeley National Laboratory found that by 2008, the state's efficiency programs comprised one-third of nation-wide investments in efficiency (even though California has less than one-eighth of the nation's population).<sup>60</sup>

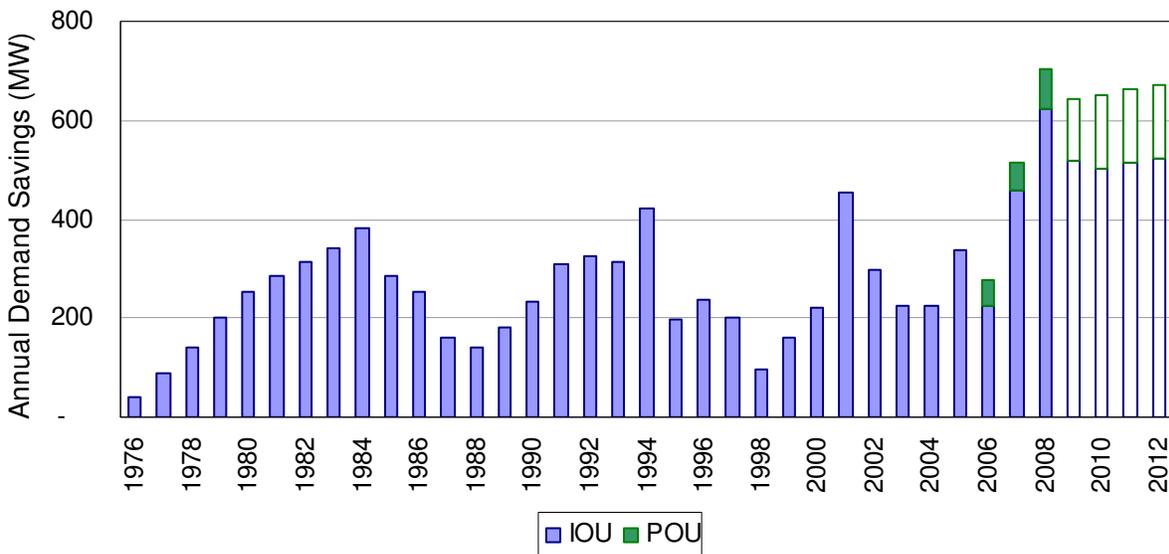
**Figure 7: California Utility Investments in Energy Efficiency Programs<sup>61</sup>**



Note: Comprehensive data on POU efficiency investments is only available beginning in 2006; however, many POUs have offered programs for decades. POUs have not yet reported their planned investments for 2010-2012. IOU investments include both electricity and natural gas efficiency programs, however, most POUs only provide electricity service and programs. IOUs provide approximately 75% of the state's electricity and POUs provide approximately 25%.<sup>62</sup>

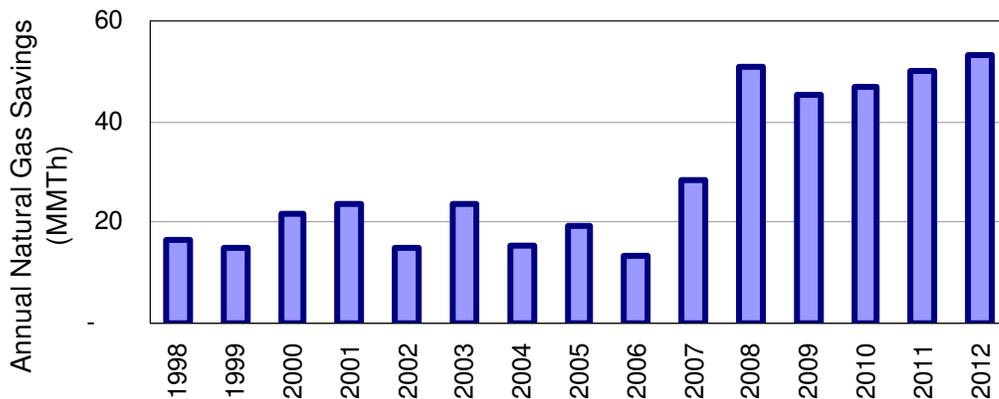
These investments yielded enormous savings and enabled the state to become a leader on efficiency. The state's electric demand savings and natural gas savings (see Figures 8 and 9) also increased in recent years alongside the electric energy savings illustrated in Figure 4.

**Figure 8: Electric Demand Savings From California Utility Efficiency Programs<sup>63</sup>**



Note: Comprehensive data on POU efficiency savings is only available beginning in 2006; however, many POUs have offered programs for decades. IOUs provide approximately 75% of the state's electricity and POUs provide approximately 25%.<sup>64</sup>

**Figure 9: Natural Gas Savings From California IOU Efficiency Programs<sup>65</sup>**



## SUSTAINING CALIFORNIA'S LEADERSHIP

California has made enormous progress over the last decade, but more work remains to sustain the state's leadership. Recent analyses show the state can capture thousands of additional megawatts of efficiency savings through 2020 as the cheapest resource available. The CPUC, CEC, and governing boards of the POUs must continue to adopt and improve upon the policies necessary to enable the IOUs and POUs to take advantage of all cost-effective savings.

In particular, the CPUC should continue to update the California Long Term Energy Efficiency Strategic Plan, as its focus on transforming markets to provide efficient products is critical to sustain savings over the long-term. The Strategic Plan establishes a vision with concrete actions

for how the state can continue to achieve savings on the scale that is needed to meet AB 32's objectives. In addition, the CPUC should:

- establish aggressive new energy saving targets for the IOUs through 2020,
- improve and extend the performance-based risk/reward incentive mechanism to align customer and shareholder interests in maximizing cost-effective efficiency savings, and
- improve the process for evaluating program accomplishments.<sup>66</sup>

The POUs and CEC should continue working together through the CEC's new working group process to expand the POUs' efficiency programs.<sup>67</sup> The POUs, with the CEC's help, should:

- set aggressive new long-term saving targets to capture all cost-effective savings,
- integrate efficiency into their resource procurement to ensure POUs invest in all energy savings that are cheaper than generation alternatives, and
- establish independent evaluation of every POU's program accomplishments.

The POUs and IOUs should continue their efforts to engage stakeholders and improve efficiency program offerings to ensure their portfolios are as comprehensive as possible. In particular, program design should increasingly focus on attaining significant efficiency savings at each existing and new building. This is recognized in the CPUC's discussion of whole house performance programs for the 2010-2012 program cycle and in a new law directing the CEC to pursue a statewide retrofit program.<sup>68</sup> In addition, programs targeted specifically to help low-income households should continue to try to reach every qualifying household.

Research and development of new efficient technologies through the CEC's Public Interest Energy Research (PIER) program should continue to help ensure that these efficiency programs can capture new energy saving opportunities, even as old ones are exhausted. And the utilities' improved efficiency programs should, in turn, help lay the foundation for the CEC and federal government to further tighten building and appliance efficiency standards.

Thanks to remarkable advances in the state's energy efficiency policies and programs over the last decade, California has re-established itself as a leader in energy efficiency and the state has reaped enormous economic and environmental benefits. Continuing to improve upon and expand the state's energy efficiency programs will help create jobs, lower utility bills and jump-start the economy, while at the same time continuing to improve air quality and curb global warming.

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<sup>1</sup> *Infra* note 27.

<sup>2</sup> California Public Utilities Commission (CPUC) Press Release, "CPUC Makes Largest Commitment Ever Made by a State to Energy Efficiency," (September 24, 2009). Available at: [http://docs.cpuc.ca.gov/PUBLISHED/NEWS\\_RELEASE/107424.htm](http://docs.cpuc.ca.gov/PUBLISHED/NEWS_RELEASE/107424.htm).

<sup>3</sup> The authors gratefully acknowledge Eric Wanless, Principal at Norwest Consulting, for his assistance in developing these NOx emission reduction factors. NOx emissions reductions for electric energy efficiency are 0.026 metric tons/GWh, based on displacement of electricity produced from an average natural gas combined cycle power plant. See Climate Action Team, *Updated Macroeconomic Analysis of Climate Strategies Presented in March 2006 Climate Action Team Report*, Final Report, p.14 (October 2007); National Energy Technology Laboratory, *Cost and Performance Baseline for Fossil Energy Plants*, Vol. 1, DOE/NETL-2007/1281 (May 2007); Northwest Power and Conservation Council, *New Resource Characterization for the Fifth Power Plan: Natural Gas Combined Cycle Gas Turbine Power Plants* (August 8, 2002); Energy and Environmental Economics, *Methodology and Forecast of the Long Term Avoided Costs for the Evaluation of California Energy Efficiency Programs*, p.72-73 (October 2004). NOx emissions reductions for natural gas efficiency are 0.45 metric tons/MMTh, based on average end use emission rates. Energy and Environmental Economics, *Methodology and Forecast of the Long Term Avoided Costs for the Evaluation of California Energy Efficiency Programs*, p.75 (October 2004).

<sup>4</sup> *Infra* notes 41 and 42.

<sup>5</sup> *Infra* note 27.

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<sup>6</sup> Based on an average consumption of 7.411 MWh per household per year in California. California Energy Commission (CEC), *California Energy Demand 2008-2012 Staff Revised Forecast*, CEC-200-2007-015-SF2, p.46 (November 2007) (12,489,014 households in California in 2007); CEC, *Energy Consumption Data Management System, Electricity Consumption by County* (2007) (In the residential sector, in 2007, California consumed 92,559 GWh, while San Mateo and San Francisco counties together consumed 3,044 GWhs). Available at: <http://ecdms.energy.ca.gov/elecbycounty.aspx>.

<sup>7</sup> Investment data, see *infra* note 54.

<sup>8</sup> Average of historic levelized costs, as reported by IOUs. Energy Efficiency Groupware Application (EEGA), Annual Reports, Table 4 (2006-2008 costs). Available at: <http://eega2006.cpuc.ca.gov>. CPUC, *Resolution E-4298* (December 17, 2009) (adopting the Market Price Referent for the 2009 Renewable Portfolio Standard). Available at: [http://docs.cpuc.ca.gov/PUBLISHED/FINAL\\_RESOLUTION/111386.htm](http://docs.cpuc.ca.gov/PUBLISHED/FINAL_RESOLUTION/111386.htm).

<sup>9</sup> From 1998 to 2008 the IOUs' programs alone served about 1.6 million low-income households, or about 42% of all eligible participants. California Public Utilities Commission. *California Long Term Energy Efficiency Strategic Plan*, p. 25 (September 18, 2008). Available at: [www.californiaenergyefficiency.com](http://www.californiaenergyefficiency.com). POU's offer their own low-income efficiency programs to their customers, however, we are not aware of a comprehensive source of information about the POU's' programs.

<sup>10</sup> Cavanagh, R., *Graphs, Words and Deeds: Reflections on Commissioner Rosenfeld and California's Energy Efficiency Leadership*, Innovations: Energy for Change, MIT, vol. 4, issue 4 (Fall 2009).

<sup>11</sup> Sudarshan, A. and Sweeney, J., *Deconstructing the "Rosenfeld Curve,"* Draft Working Paper, Stanford Precourt Institute for Energy Efficiency (June 2008). Available at: [www.stanford.edu/group/peec/cgi-bin/docs/modeling/research/Deconstructing%20the%20Rosenfeld%20Curve.pdf](http://www.stanford.edu/group/peec/cgi-bin/docs/modeling/research/Deconstructing%20the%20Rosenfeld%20Curve.pdf). Note, however, that this study does not explain how factors other than energy efficiency changed suddenly in 1975 for California relative to the rest of the nation; its statistical analysis is largely restricted to the more recent time period.

<sup>12</sup> Rosenfeld, A.H., and D. Poskanzer, *A Graph is Worth a Thousand Gigawatt-Hours: How California Came to Lead the United States in Energy Efficiency*, Innovations: Energy for Change, MIT, vol. 4, issue 4 (Fall 2009).

<sup>13</sup> "Other 49 states" does not include California, in order to control for any comparison of California to itself. Electricity consumption data from the U.S. Department of Energy's Energy Information Administration (EIA) and California Energy Commission (CEC). For California and federal consumption from 1960-1979: EIA, *State Energy Data System (SEDS) 2007*, Data File "Consumption, Physical Units, 1960-2007," ESTCP (August 28, 2009). Available at: [www.eia.doe.gov/emeu/states/seds.html](http://www.eia.doe.gov/emeu/states/seds.html). For California consumption from 1980-1989: CEC, *1998 Baseline Energy Outlook*, Table A1: Statewide Outlook for California Electricity Consumption by Sector, p. A-2, P300-98-012 (August 1998) (includes self-generation for most utilities). Available at: <http://www.energy.ca.gov/reports/300-98-012.PDF>. For California consumption from 1990-2007: CEC, *Energy Consumption Data Management System (ECDMS), Electricity Consumption by Entity* (statewide totals derived by summing all entities and totals include self-generation). Available at: <http://www.ecdms.energy.ca.gov>. Federal consumption data for 1980-2007 from: EIA, *Annual Energy Review 2008 (AER)*, Table 8.9: Electricity End Use, Selected Years, Report No. DOE/EIA-0384 (June 26, 2009). Available at: <http://www.eia.doe.gov/emeu/aer/elect.html>. AER data assumes that the amount of electricity sold to end users is the amount of electricity consumed by the end-use sectors and includes self-generation. AER, fn. 6. Federal and California population data for 1960-2007: EIA, *SEDS*, TPOPP. The population data used in SEDS is from the U.S. Department of Commerce, Bureau of the Census, and resident population estimates by State. See SEDS 2007, *Consumption, Technical Notes, Appendix C: Resident Population*, p.165. Available at: [www.eia.doe.gov/emeu/states/seds\\_tech\\_notes.html](http://www.eia.doe.gov/emeu/states/seds_tech_notes.html).

<sup>14</sup> Nadel, S., *Energy Efficiency Resource Standards: Experience and Recommendations*, ACEEE Report E063 (March 2006). Kushler, M. et al, *Meeting Aggressive New State Goals for Utility-Sector Energy Efficiency: Examining Key Factors Associated with High Savings*, ACEEE Report E091 (March 2009) (showing that the top states generally achieve efficiency savings of more than 1% of sales each year). Eldridge, M. et al, *The State Energy Efficiency Scorecard for 2006*, ACEEE Report E075 (June 2007).

<sup>15</sup> Eldridge, M. et al., *The 2009 State Energy Efficiency Scorecard*, ACEEE Report E097, p iii (October 2009); Kushler, M. et al, *Meeting Aggressive New State Goals for Utility-Sector Energy Efficiency: Examining Key Factors Associated with High Savings*, ACEEE Report E091, p.3 (March 2009).

<sup>16</sup> Next 10, *California Green Innovation Index*, p.64 (2009) (showing electricity costs for the rest of the U.S. to be 38% greater than for California, as a share of GDP). Available at: [www.nextten.org/next10/publications/greenInnovation09.html](http://www.nextten.org/next10/publications/greenInnovation09.html).

<sup>17</sup> California's average residential electricity bill in 2007 was \$83.60, 16% below the national average of \$99.70. The states with the nation's highest average residential electricity bills are Hawaii, Connecticut, Texas and Florida, each of which exceeds the national average by more than 30%. EIA, *Average Monthly Bill for Residential Electric Utility*

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*Customers* (2009). Available at: [www.eia.doe.gov/cneaf/electricity/esr/table5.xls](http://www.eia.doe.gov/cneaf/electricity/esr/table5.xls). California's average residential electricity rate was 14.91 cents per kWh, 29% percent above the national average of 11.55 cents per kWh. EIA, *Average Retail Price of Electricity to Ultimate Consumers by End-Use Sector, by State*, Report No. DOE/EIA-0226 (October 2009).

<sup>18</sup> For consumption data, see *supra* note 13. Indexed productivity measured as real gross domestic product by state in chained 2000 dollars per kWh and indexed to 1980 levels. Gross domestic product for California and 49 other states from: Bureau of Economic Analysis, U.S. Department of Commerce, *Regional Accounts Data*, Interactive Tables: Gross Domestic Product by State (last visited March 2, 2010). Available at: <http://www.bea.gov/regional/gsp/>. GDP data is based on NAICS industry definitions and methodologies. BEA provides NAICS data back to 1997 and SIC data for years before 1997. However, BEA strongly cautions against appending the SIC time series to the NAICS time series to get a continuous time series, as the discontinuity in source data and estimation methodologies would be problematic. Instead, NRDC uses the following methodology to estimate a continuous time series that preserves continuity of industry assumptions: GDP in chained 2000 dollars data is extended to pre-1997 years by applying the growth rate of SIC Quantity Indexes to NAICS Quantity Indexes; then applying the pre-1997 NAICS Quantity Indexes to NAICS 2000 dollars to estimate pre-1997 chained 2000 dollars. The authors gratefully acknowledge Gabriel Madero (BEA) for his assistance with these methodologies (March 2, 2010 discussion).

<sup>19</sup> *Id.*

<sup>20</sup> *Id.*

<sup>21</sup> In 2020, the potential for cumulative annual savings from efficiency programs is projected to be 7,049 MW and 28,823 GWh greater than in 2009. POU data for 2017-2020 projected as average of savings targets from 2013-2016. CPUC, *Decision Adopting Interim Energy Efficiency Savings Goals from 2012 Through 2020, And Defining Energy Efficiency Savings Goals for 2009-2011*, D.08-07-047, p.4-5 (July 2008) (for IOU savings 2013-2020); CPUC, *Decision Approving 2010-2012 Energy Efficiency Portfolios and Budgets*, D.09-09-047, p.4, 45-46 (October 2009) (for IOU savings 2010-2012); California Municipal Utility Association (CMUA), *Establishing Energy Efficiency Targets: A Public Power Response to AB 2021*, Final Update, p.26 (October 2007) (for most POU goals 2010-2016); CEC, *Achieving All Cost-Effective Energy Efficiency for California*, Final Staff Report, CEC-200-2007-019-SF, p.C-1 (December 2007) (for LADWP, SMUD, Palo Alto, and Redding goals 2010-2016).

<sup>22</sup> California Air Resources Board (CARB), *Climate Change Scoping Plan Pursuant to AB 32*, pp.17, 41-44, (December 2008) (stating that 26.3 MMTCO<sub>2</sub>E of reductions are expected to come from all efficiency measures, with 15.2 MMTCO<sub>2</sub>E from electricity programs and standards, and 4.3 MMTCO<sub>2</sub>E from natural gas programs and standards). See CARB, *AB 32 Appendix H – Public Health Analysis*, p.H-32, (December 2008); CARB, *AB 32 Appendix C - Sector Overviews and Emission Reduction Strategies*, p.C-89 (December 2008) (“Fossil fuel-based electricity generation emits ozone precursors (VOC and NO<sub>x</sub>) and particulate matter, both of which are serious public health concerns.”).

<sup>23</sup> Roland-Holst, *Energy Efficiency, Innovation, and Job Creation in California*, UC Berkeley, p. 4 (October 2008). Available at:

[http://are.berkeley.edu/~dwrh/CERES\\_Web/Docs/UCB%20Energy%20Innovation%20and%20Job%20Creation%2010-20-08.pdf](http://are.berkeley.edu/~dwrh/CERES_Web/Docs/UCB%20Energy%20Innovation%20and%20Job%20Creation%2010-20-08.pdf). Figures are cumulative totals from 1972 through 2006; if one assumes that the average defined job has a life of seven years, net employment was approximately 615,000 higher by 2007. Personal communication with Professor Roland-Holst (March 8, 2010).

<sup>24</sup> *Id.*, p. 5. Roland-Holst, *Energy Prices & California's Economic Security*, Figure 31: Employment Intensity and Average Wages by Sector, p. 29 (October 2009).

<sup>25</sup> In nominal dollars. *Infra* note 27.

<sup>26</sup> *Supra* note 2.

<sup>27</sup> All data is net of “free riders.” Annual net benefit numbers are calculated by scaling multi-year net benefit totals by annual expenditures. 2006-2008 IOU “Performance Earnings Basis” (PEB) calculated from: CPUC, *Decision Regarding RRIM Claims for the 2006-2008 Program Cycle*, D.09-12-045, Appendix A: Adopted Incentive Earnings for the Second Installment of the 2006-2008 Program Cycle (December 17, 2009) (PEB calculated from earnings rate and maximum earnings). PEB is comprised of 2/3 TRC and 1/3 PAC net benefits. The TRC portion of the PEB in D.09-12-045 is from: CPUC, *Energy Efficiency 2006-2008 Interim Verification Report*, Resolution E-4272 (October 15, 2009) for PG&E (because the PEB in that report and D.09-12-045 were nearly identical); Darren Hanway, SCE (February 10, 2010 data request); and Athena Besa, Sempra Utilities (February 16, 2010 data request). The 2006-08 net benefit estimates have been reduced to subtract the \$143.7 million in incentive payments the CPUC awarded the utilities for their accomplishments in the 2006-08 program cycle (as part of the CPUC's risk/reward performance-incentive mechanism) in D.08-12-059 and D.09-12-045. Scaling based on annual expenditures from: EEGA, *Annual Reports*, Table 3 (May 1, 2009). The CPUC's Energy Division has not calculated net benefits for the IOUs' 2004-2005 programs based on their verified savings estimates, so NRDC estimated these net benefits by reducing utility-reported

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net benefits proportionally to the reduction in verified savings relative to reported savings for PG&E, SoCalGas, and SDG&E; SCE's net benefits provided by SCE based on the CPUC's verified savings (Darren Hanway, SCE, February 12, 2010 data request). CPUC, *Energy Efficiency 2006-2008 Interim Verification Report*, Resolution E-4272, Table 31: RRIM Calculator Output with Positive and Negative Interactive Effects, (October 15, 2009) (2004-2005 savings). Available at: [http://docs.cpuc.ca.gov/PUBLISHED/FINAL\\_RESOLUTION/108628.htm](http://docs.cpuc.ca.gov/PUBLISHED/FINAL_RESOLUTION/108628.htm). Scaling based on annual expenditures from: PG&E, SCE, SDG&E, SoCalGas, *Annual Earnings Assessment Proceeding* (May 2, 2005) (2004 expenditures). PG&E, SCE, SDG&E, SoCalGas, *Annual Earnings Assessment Proceeding* (November 16, 2006) (2005 expenditures). POU net benefits estimates calculated from individual POU TRC ratios and expenditures because POU TRC net benefits were not provided in SB 1037 reports. (Note: while this is not a precise calculation of TRC net benefits since it does not include discounting and is based on PAC expenditures rather than TRC costs, it is a good proxy given the available data). CMUA, *Energy Efficiency in California's Public Power Sector – A Status Report* (March 2009, March 2008, and December 2006). Comprehensive POU data only available after 2006, when SB 1037 began requiring utilities to submit energy efficiency data to CEC.

<sup>28</sup> Estimated based on 2008 electricity deliveries to end users reported in CEC, *California Energy Demand 2010-2020 Adopted Forecast*, CEC-200-2009-012-CMF, Form 1.1c, p. 39 (December 2009) Available at: [www.energy.ca.gov/2009publications/CEC-200-2009-012/CEC-200-2009-012-CMF.PDF](http://www.energy.ca.gov/2009publications/CEC-200-2009-012/CEC-200-2009-012-CMF.PDF). IOU figures include sales to direct access customers in their service territories, since those customers are eligible to participate in the IOU efficiency programs.

<sup>29</sup> *Supra* note 8.

<sup>30</sup> *Id.*

<sup>31</sup> California Department of Community Services and Development, "Low-Income Home Energy Assistance Program (LIHEAP),"

[www.csd.ca.gov/Programs/Low%20Income%20Home%20Energy%20Assistance%20Program%20\(LIHEAP\).aspx](http://www.csd.ca.gov/Programs/Low%20Income%20Home%20Energy%20Assistance%20Program%20(LIHEAP).aspx).

<sup>32</sup> 2009 IOU Low Income Program Reports (reported in LIEE Table 3). Available at:

[www.liob.org/resultsqv.cfm?doctypes=10](http://www.liob.org/resultsqv.cfm?doctypes=10).

<sup>33</sup> Income limits effective June 1, 2009 through May 31, 2010. See

[www.cpuc.ca.gov/PUC/energy/Low+Income/liee.htm](http://www.cpuc.ca.gov/PUC/energy/Low+Income/liee.htm). California Long Term Energy Efficiency Strategic Plan, *supra* note 9.

<sup>34</sup> CPUC D.08-11-031, *Decision on Large Investor-Owned Utilities' 2009-11 Low Income Energy Efficiency (LIEE) and California Alternate Rates for Energy (CARE) Applications*, p.3 (November 10, 2008). Available at:

[http://docs.cpuc.ca.gov/PUBLISHED/FINAL\\_DECISION/93648.htm](http://docs.cpuc.ca.gov/PUBLISHED/FINAL_DECISION/93648.htm); 2009 IOU Low Income Program Reports, available at [www.liob.org/resultsqv.cfm?doctypes=10](http://www.liob.org/resultsqv.cfm?doctypes=10) (updated budget estimates for 2009; e.g., SCG's 2009 budget increased just over \$6 million from the time of Decision 08-11-031).

<sup>35</sup> *Supra* note 9.

<sup>36</sup> *Supra* note 34.

<sup>37</sup> American Lung Association, *State of the Air 2009*, p. 21 (2009). Available at:

[www.lungusa.org/assets/documents/publications/state-of-the-air/state-of-the-air-report-2009.pdf](http://www.lungusa.org/assets/documents/publications/state-of-the-air/state-of-the-air-report-2009.pdf).

<sup>38</sup> 241 passenger cars driven for one year emit approximately 1 metric ton of NOx. CARB, EMFAC (Emissions Factor) Model, run for CY 2009 (performed by Luke Tonachel, NRDC, assuming 12,415 miles/year). *Supra* note 3 (stating NOx emissions).

<sup>39</sup> NOx reacts with other chemicals in the air to form ground level ozone, or smog. High levels of ozone can cause: shortness of breath, chest pain when inhaling, wheezing and coughing, asthma attacks, increased susceptibility to respiratory infections, increased susceptibility to pulmonary inflammation, and increased need for people with lung diseases to receive medical treatment and to go to the hospital. Exposure to high ozone levels for as little as one hour is linked to a particular type of cardiac arrhythmia that itself increases the risk of premature death and stroke. The National Academy of Sciences concluded that "short-term exposure to ambient ozone is likely to contribute to premature deaths." American Lung Association, *State of the Air 2009*, p. 30 (2009). See CARB, *Climate Change Scoping Plan Appendices Vol. II*, Appendix H - Public Health Analysis, Table H-8: Estimates of Statewide Outcomes of Recommended Scoping Plan Measures, H-99 (December 2008).

<sup>40</sup> *Supra* note 22.

<sup>41</sup> Includes savings from both electric and natural gas efficiency programs. Global warming pollution savings derived from cumulative (since 1976) annual electricity and natural gas savings from efficiency programs in 2008. See *infra* note 48 for electric and natural gas savings sources. Savings include avoided transmission line losses, assumed to be 7.8%, in accordance with CARB, *Climate Change Scoping Plan Appendices*, Vol 2: Analysis and Documentation, p I-23 (December 2008). Available at: [www.arb.ca.gov/cc/scopingplan/document/appendices\\_volume2.pdf](http://www.arb.ca.gov/cc/scopingplan/document/appendices_volume2.pdf). Portfolio average "effective useful life" (EUL) of annual efficiency savings assumed to be 10 years and 15 years for electric and

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natural gas savings, respectively, consistent with the portfolio average EULs from IOU-reported savings from 1998-2008. The range of 12 to 17 MMTCO<sub>2</sub>e reductions reflects varying the assumption about how much of the savings persist past the portfolio average EUL, from *no* savings persisting past the EUL to 50% of savings persisting past the EUL per the CPUC's interim guidance. CPUC, *Decision D.09-09-047*, A.08-07-021 et al., Ordering Paragraph 49, p.39 (October 1, 2009). Avoided emission rate for natural gas savings is  $5.3 \times 10^{-8}$  MMTCO<sub>2</sub>e/MMBTU, and avoided emission rate for electric savings is  $4.37 \times 10^{-7}$  MMTCO<sub>2</sub>e/MWh. CARB, *Climate Change Scoping Plan Appendices*, Vol 2: Analysis and Documentation, p I-23 (December 2008). Available at: [www.arb.ca.gov/cc/scopingplan/document/appendices\\_volume2.pdf](http://www.arb.ca.gov/cc/scopingplan/document/appendices_volume2.pdf).

<sup>42</sup> 216,000 passenger cars driven for one year produce 1 MMTCO<sub>2</sub>e. CARB, *Conversion of 1MMTCO<sub>2</sub> to Familiar Equivalents* (October 2007). Available at: [www.arb.ca.gov/cc/factsheets/1mmtconversion.pdf](http://www.arb.ca.gov/cc/factsheets/1mmtconversion.pdf).

<sup>43</sup> To put this in perspective, the Air Resources Board's most recent inventory for the annual average emissions in the 2004-06 period found total California net emissions of 478 MMTCO<sub>2</sub>e, with approximately 111 MMTCO<sub>2</sub>e from the electric sector, and approximately 73 MMTCO<sub>2</sub>e from residential, commercial and industrial combustion of natural gas. CARB, *California Greenhouse Gas Inventory for 2000-2006* (March 2009). Available at: [www.arb.ca.gov/cc/inventory/data/data.htm](http://www.arb.ca.gov/cc/inventory/data/data.htm). To meet AB 32's 2020 emissions limit, California must lower emissions to 427 MMTCO<sub>2</sub>e by 2020, and CARB estimates that will require a reduction of 169 MMTCO<sub>2</sub>e from business as usual. CARB, *Climate Change Scoping Plan Pursuant to AB 32*, p 12 (December 2008).

<sup>44</sup> CARB, *Climate Change Scoping Plan Pursuant to AB 32*, p 44 (December 2008). CARB uses a 2007 baseline, so this estimate reduces CARB's estimate of 19.5 MMTCO<sub>2</sub>e of additional savings from efficiency by 2.7 MMTCO<sub>2</sub>e to account for the savings already reported in 2007 and 2008.

<sup>45</sup> For estimates of the cost-effectiveness and opportunity for GHG emission reductions from various strategies, see, e.g., *Greenhouse Gas Modeling of California's Electricity Sector to 2020: Updated Results of the GHG Calculator, Version 3*, Energy and Environmental Economics for the CPUC, Figure 8, p 32 (October 2009) [www.ethree.com/documents/GHG\\_10.22.09/CPUC\\_GHG\\_Final\\_Report\\_28Oct09.pdf](http://www.ethree.com/documents/GHG_10.22.09/CPUC_GHG_Final_Report_28Oct09.pdf); CARB, *Climate Change Scoping Plan Pursuant to AB 32*, (December 2008); Sweeney, J., "A Cost-effectiveness Analysis of AB 32 Measures" (June 2008). Available at: [www.arb.ca.gov/cc/scopingplan/economics-sp/meetings/060308/sweeney\\_june\\_03\\_carb\\_presentation.pdf](http://www.arb.ca.gov/cc/scopingplan/economics-sp/meetings/060308/sweeney_june_03_carb_presentation.pdf).

<sup>46</sup> Assembly Bill 1890 (Brulte, 1996).

<sup>47</sup> Senate Bill 1037 (Kehoe, 2005) and Assembly Bill 2021 (Levine, 2006).

<sup>48</sup> Note that savings are calculated relative to business-as-usual levels of efficiency that are constantly improving as codes and standards are tightened and standard market practice improves (so potential savings from a specific measure gets smaller over time); therefore, constant and growing levels of savings is even more impressive as those savings become harder to achieve. 1976-1997 data from the California Energy Commission, provided by Sylvia Bender; 1998-2003 data is from IOUs' Annual Earnings Assessment Proceeding (AEAP) reports, including savings from the "Summer Initiatives" during California's electricity crisis; 2004-08 IOU annual savings data are calculated by scaling program totals by utility-reported annual savings. PUC, *Energy Efficiency 2006-2008 Interim Verification Report*, Resolution E-4272, Table 8: 2004-2005 Cumulative Savings Estimates, Final VR Ex-Post Evaluation, p.37 (October 15, 2009) (2004-2005 savings). Available at: [http://docs.cpuc.ca.gov/PUBLISHED/FINAL\\_RESOLUTION/108628.htm](http://docs.cpuc.ca.gov/PUBLISHED/FINAL_RESOLUTION/108628.htm). PG&E, *Annual Earnings Assessment Proceeding*, Application No. 05-05-001 (May 2, 2005); SCE, *Annual Earnings Assessment Proceeding*, Application No. 05-05-005 (May 2, 2005); SDG&E, *Annual Earnings Assessment Proceeding*, (May 2, 2005); SoCalGas, *Annual Earnings Assessment Proceeding*, (May 2, 2005) (utility-reported program savings used for scaling purposes only). PUC, *Decision Regarding RRIM Claims for the 2006-2008 Program Cycle*, D.09-12-045, R.09-01-019, Table ES2b: Impacts with Positive and Negative Interactive Effects, 2nd Earnings Claim for PY 2006-2008, p.C3 (December 17, 2009) (2006-2008 program cycle total savings). PG&E, 2008 Annual Report, EEGA, Table 1 (May 1, 2009); SCE, 2008 Annual Report, EEGA, Table 1 (August 3, 2009); SDG&E, 2008 Annual Report, EEGA, Table 1 (August 12, 2009); SoCalGas, 2008 Annual Report, EEGA, Table 1 (September 5, 2009) (utility-reported program savings used for scaling purposes only). 2009-2012 IOU savings goals are from CPUC, *Decision Approving 2010-2012 Energy Efficiency Portfolios and Budgets*, D.09-09-047, pp.4, 45-46 (September 24, 2009). IOU 2006-2012 data includes savings from low-income energy efficiency and codes and standards advocacy (accounting for less than 10% of annual savings in almost all cases), but pre-2006 do not. 2009-2012 IOU data is gross projected actuals, 2006-2008 IOU data is net actuals, and pre-2006 IOU data is net actuals plus committed savings. Comprehensive data for the POU's is only available after 2006, when SB 1037 required utilities to submit EE data to the CEC. CMUA, *Energy Efficiency in California's Public Power Sector – A Status Report* (March 2009, March 2008, and December 2006). Available at: <http://www.ncpa.com/energy-efficiency-reports.html>. CMUA, *Establishing Energy Efficiency Targets: A Public Power Response to AB 2021*, Final Update, p.26 (October 2007) (for most POU goals 2009-2012). CEC, *Achieving All Cost-Effective Energy Efficiency for California*, Final Staff Report, CEC-200-2007-

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019-SF, p.C-1 (December 2007) (for LADWP, SMUD, Palo Alto, and Redding goals for 2009-2012). Only electric data is included for POU, since nearly all only provide electric service. The drop in IOU electric savings from 2008 to 2009 is possibly due to the following factors: (1) 2008 is unusually high because of late 2006 start up to the 3-year program cycle and switch to counting “actual” savings instead of “actual and committed” savings; (2) 2009 is the first year of the program cycle and therefore a ramp up year; and (3) The 2009-12 portfolio includes a change in portfolio mix towards strategic plan-related programs whose savings are harder to quantify.

<sup>49</sup> *Supra* note 28.

<sup>50</sup> California Energy Commission, “Energy Commission Approves New Energy Efficient Measures for California Homes and Businesses,” press release, April 28, 2008.

<sup>51</sup> In 2008, the POU reported savings of approximately 0.6% of sales. To be considered truly aggressive, savings should exceed 1% of sales each year.

<sup>52</sup> For more information on individual POU energy efficiency performance, see NRDC’s letter to the California Municipal Utilities Association, *Re: Energy Efficiency in California’s Public Power Sector* (June 30, 2009). Available at: [www.energy.ca.gov/2009\\_energypolicy/documents/2009-06-09\\_workshop/comments/NRDC\\_RE\\_Continuing\\_to\\_Pursue\\_Additional\\_Cost\\_Effective\\_EE\\_2009-06-30\\_TN\\_52237.pdf](http://www.energy.ca.gov/2009_energypolicy/documents/2009-06-09_workshop/comments/NRDC_RE_Continuing_to_Pursue_Additional_Cost_Effective_EE_2009-06-30_TN_52237.pdf)

<sup>53</sup> POU sales data from 2006-2007 are from the California Energy Commission, provided by Irene Salazar through June 29, 2009 and April 23, 2008 data requests. POU sales for 2008-2009 are projected from 2009 CMUA SB 1037 Report, *supra* note 48. IOU sales data from 2002-2008 are from utilities’ Form 1.1, 1.1a, and 1.2 submissions to the CEC, provided by Tom Gorin (CEC) through July 8, 2009 data request, and include service area sales to bundled and direct access customers, since direct access customers are eligible to participate in the EE programs. IOU sales data for 2009-2012 are projected by NRDC based on 2006-2008 compound annual growth rates. See *supra* note 48 for savings data sources.

<sup>54</sup> Investments include EM&V. 1998-2005 IOU investment data from: IOUs, AEAP report data (November 17, 2006) (includes Summer Initiative during the Electricity Crisis). 2006-2008 IOU investment data from: EEGA database, *supra* note 8, Table 3. 2009 IOU investment data from: EEGA December Monthly Report, Table 1.2 (February 1, 2010). 2010-2012 IOU investment data from: PG&E, *Energy Efficiency 2009-2011 Portfolio*, A0807031, Table 4.1: Portfolio Budget (November 23, 2009); SCE, *2010-2012 Second Amended Compliance Filings*, A0807021, Exhibit 2, Table 4.1: Portfolio Budget (November 23, 2009); SDG&E, *Application For Approval Of Electric And Gas Energy Efficiency Programs And Budgets For Years 2009-2011*, A0807023, Table 4.1: Portfolio Budget, (December 22, 2009); SoCalGas, *Application for Approval of Gas Energy Efficiency Programs and Budgets for Years 2009-2011*, A0807022, Table 4.1: Portfolio Budget (November 23, 2009). Available at:

[https://www.pge.com/regulation/EnergyEfficiency2009-2011-Portfolio/Other-Docs/PGE/2009/EnergyEfficiency2009-2011-Portfolio\\_Other-Doc\\_PGE\\_20091123-01Atch06-Pt01.xls](https://www.pge.com/regulation/EnergyEfficiency2009-2011-Portfolio/Other-Docs/PGE/2009/EnergyEfficiency2009-2011-Portfolio_Other-Doc_PGE_20091123-01Atch06-Pt01.xls);

<http://www.sce.com/AboutSCE/Regulatory/eefilings/proposals/>; <http://www.sdge.com/regulatory/A08-07-023.shtml>;

<http://www.socalgas.com/regulatory/A0807022.shtml>. IOU revenue from: EIA, *861 - Annual Electric Power Industry Report*, File 2 (2002-2007); EIA, *826 - Database Monthly Electric Utility Sales and Revenue Data* (2008-2009)

(complete through November 2009 and supplemented with NRDC projection for December 2009 based on YTD monthly average revenue). Available at: <http://www.eia.doe.gov/cneaf/electricity/page/eia861.html>;

<http://www.eia.doe.gov/cneaf/electricity/page/eia826.html>. NRDC projected 2010-2012 revenues based on IOUs’ compound annual growth rate for 2006-09. POU investment data from: CEC, *Achieving Cost-Effective Energy Efficiency for California: Second Annual AB 2021 Progress Report* (June 2009); CMUA, Annual SB 1037 Reports,

*supra* note 48. 2006-2008 POU revenue from: EIA, Form 861. 2009 POU revenue is NRDC projection based on compound annual growth rate from 2001-2007. Total POU expenditures and revenues assumed to be all from electricity.

<sup>55</sup> Both investor-owned and publicly-owned utilities have an obligation to maintain their financial health and both need to recover large costs that are independent of energy use in the near term (for example, paying for generation, transmission and distribution equipment already installed) but that customers pay for in volumetric rates. This creates powerful disincentives for investments in energy efficiency if a utility’s recovery of its authorized fixed costs is tied to sales. The CPUC completed decoupling the IOUs’ fixed cost recovery from sales (removing that powerful disincentive) in 2005 pursuant to Assembly Bill 29x (Kehoe, 2001), reinstating a policy that had operated successfully since the late 1970s but that was discontinued with deregulation. However, none of the state’s POU have “decoupled” and their financial health continues to be tied to sales volumes, impeding progress towards aggressive efficiency programs.

<sup>56</sup> Since publicly-owned utilities are owned by their customers, shareholder performance-incentives are not applicable. However, for POU that provide bonuses or other performance incentives to staff, they should incorporate metrics that reflect performance at delivering energy efficiency savings and the policy that efficiency is the top priority resource.

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<sup>57</sup> Integrating energy efficiency into utility resource procurement involves two primary components: (i) accounting for energy efficiency savings as a resource in conducting long-term planning and procurement, and (ii) investing in efficiency by redirecting procurement investments from more costly generation to cheaper efficiency opportunities, above and beyond the minimum public goods charge required by law to capture all cost-effective savings. The ten-year energy efficiency saving targets the POUs adopt pursuant to AB 2021 are the first step to integrating efficiency into long-term resource planning and procurement.

<sup>58</sup> A comprehensive program portfolio should address the needs of each market segment, include a comprehensive set of efficiency measures, and focus on both short- and long-term savings. Many POUs' portfolios lack elements of a comprehensive portfolio, such as emerging technology programs and programs to develop proposals to upgrade efficiency codes. While the IOUs' portfolios are among the most comprehensive in the nation and provide a good example of what a comprehensive portfolio should include, the CPUC, IOUs and other stakeholders continue to work on improvements to ensure the portfolios continue to be as comprehensive and innovative as possible. The IOUs' 2009-12 portfolios include the following types of programs:

- Residential Retrofit programs, including appliance and consumer electronic rebates, information, audits, upstream, direct install, HVAC incentives, HVAC quality control and maintenance, and comprehensive tiered whole-building retrofit programs.
- Residential New Construction programs, including new homes (single family, multi-family, manufactured) and green building practices.
- Non-Residential Retrofit programs, including rebates, audits, standard offer, calculated rebates, technical assistance, direct install, upstream, continuous energy savings, pump test and repair, benchmarking, and on-bill financing.
- Non-Residential New Construction programs, including design assistance, owner and design team incentives, and green building practices.
- Emerging Technologies programs to increase technology adoption and supply.
- Codes and Standards programs to develop and advocate for proposals to upgrade codes at state and local levels and to assist with increased code compliance.
- Partnerships with local governments and higher education institutions, including retrofits, benchmarking and financing.
- Workforce, Education, & Training programs to provide integrated workforce training programs and needs assessments.
- Marketing, Education, & Outreach including statewide marketing (e.g., general market, multi-lingual, and rural education), local targeted marketing, integrated program outreach, development of a central web portal, and school education programs.
- Competitive Solicitations for innovative technologies and programs, harder to reach markets (e.g., mobile homes, multi family), and specialized programs (e.g., entertainment centers).
- Pilot programs, to continue to explore new programs and technologies to expand the scope and comprehensiveness of the portfolio.

<sup>59</sup> Data from EEGA database, *supra* note 8.

<sup>60</sup> Barbose, G. et al, *The Shifting Landscape of Ratepayer Funded Energy Efficiency in the U.S.*, Lawrence Berkeley National Laboratory, LBNL-2258E (July 2009). United States Census Bureau, *Annual Estimates of the Resident Population for the United States, Regions, and States*, NST-EST2008-01 (2008) (estimating 36.8M people in California and 304M in the United States). Available at: [www.census.gov/popest/states/tables/NST-EST2006-01.xls](http://www.census.gov/popest/states/tables/NST-EST2006-01.xls) and [www.census.gov/popest/states/NST-ann-est.html](http://www.census.gov/popest/states/NST-ann-est.html).

<sup>61</sup> Investments data, *see supra* note 54.

<sup>62</sup> *Supra* note 28.

<sup>63</sup> *Supra* note 48.

<sup>64</sup> *Supra* note 28.

<sup>65</sup> *Supra* note 48.

<sup>66</sup> These issues are currently under consideration by the CPUC in two parallel proceedings R.09-01-019 and R.09-11-0147.

<sup>67</sup> CEC, *Errata to the 2009 Integrated Energy Policy Report*, p. 4 (December 16, 2009). The CEC's latest report as part of their process working with the POUs to improve energy efficiency is *Achieving Cost-Effective Energy Efficiency for California: 2008 Progress Report*, CEC-200-2008-008-SF (December 2009), Available at: [www.energy.ca.gov/2009publications/CEC-200-2009-008/CEC-200-2009-008-SF.PDF](http://www.energy.ca.gov/2009publications/CEC-200-2009-008/CEC-200-2009-008-SF.PDF).

<sup>68</sup> CPUC D.09-09-047, *supra* note 21, pp. 7, 113. Assembly Bill 758 (Skinner, 2009).