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Draft Action Plan for
the Comprehensive
Energy Efficiency
Program for Existing
Buildings

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California Energy Commission
Efficiency and Renewable Energy Division

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ABSTRACT

The Comprehensive Energy Efficiency Program for Existing Buildings of 2009 (Assembly Bill 758, Skinner, Chapter 470, Statutes of 2009) anticipates the evolution and transformation of the energy efficiency market and the delivery of substantial energy savings and greenhouse gas emissions reductions inherent in California's existing building stock. This *Draft Action Plan for the Comprehensive Energy Efficiency Program for Existing Buildings* provides a roadmap that encompasses existing energy efficiency programs and will support future efforts by providing strategies for understanding and fully overcoming market barriers.

To achieve maximum energy savings and market transformation, the plan outlines a series of no regrets strategies, voluntary pathways, and mandatory approaches. No regrets strategies include increased access to data; improving compliance with building codes; a comprehensive marketing, education, and outreach strategy; and a workforce that is trained in energy efficiency concepts and practices. Voluntary pathways include residential upgrades, standardized commercial benchmarking tools, upgrades to small and medium commercial buildings, upgrades to public buildings, inclusion of energy efficiency measures property valuation, and financing for energy efficiency upgrades. Lastly, mandatory approaches include consideration of a disclosure program for the largest commercial and public buildings and a public process to determine the need for more widespread disclosures and/or required basic energy upgrades.

Keywords: Assembly Bill 758, auditing, benchmarking, California, commercial buildings, commissioning, compliance and enforcement, education and outreach, energy efficiency upgrades, finance programs, green workforce development, greenhouse gas emissions, marketing, nonresidential buildings, property valuation, public buildings, public leadership, residential buildings, retrocommissioning, Title 24

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MESSAGE FROM COMMISSIONER ANDREW MCALLISTER

California has long been a leader in efforts to improve building efficiency, both at the time of construction and upon a major remodel or equipment replacement. Our state's efforts have historically included advanced building codes and appliance standards, a wide variety of retail and upstream incentive programs, design and installation training, public outreach, among many others. Our per capita energy consumption is among the lowest in the country and has not grown appreciably since 1974, in sharp contrast to the rest of the country. As a consequence, we Californians are saving literally billions of dollars each year in reduced energy costs – dollars that we can instead invest in productive pursuits and improved quality of life. In some important respects, we are already relatively inoculated against the vicissitudes of future energy supply.

Happily, energy efficiency is a gift that keeps on giving. Advances in technology and ever-improving understanding of the nature of energy demand continually produce new opportunities for cost-effective improvements to our existing homes, businesses, and public facilities. This is especially fortuitous as we look toward 2020 and beyond to 2050: any realistic path to meeting the state's long-term targets for reducing energy usage and carbon emissions must necessarily include large-scale improvements to the existing building stock. AB 758 recognizes this basic fact and rightly targets our built environment as a central arena for positive change.

Leading indicators of existing building upgrades are moving in the right direction: the penetration of energy-saving projects is growing, and increasing numbers of qualified contractors are present in the marketplace. But given the scale of the need, progress to date has been far too modest. Program efforts should support customer decisions with useful tools, actionable knowledge, accurate information, and access to capital, and should facilitate streamlined delivery by contractors and other building professionals who employ well-designed, scalable business models. In addition, policy certainly ought not to increase nonessential transaction costs for customers or contractors.

Wise application of innovative technologies can improve the effectiveness of virtually all program efforts in the state. For example, new analytical tools can use our modernizing information infrastructure and networks to extract highly concrete lessons from existing program efforts, and then optimize them going forward – in the process greatly enhancing accountability for achieving the intended results. Such tools clearly complement California's broader imperative to improve resilience of the grid by allowing insight into an increasingly large and diverse network of small- and medium-sized, location-specific energy resources. California is in an enviable position to lead development and intelligent deployment of innovative solutions, while ensuring that long-term benefits accrue equitably to all customers.

This AB 758 Action Plan lays out strategies that will help energy efficiency markets move toward much larger scale. First, no regrets strategies will provide critical foundational resources such as broader access to relevant information, code compliance support, widespread education and outreach, and high-quality targeted workforce development. At the same time, enhanced efforts to enable and stimulate voluntary upgrades will provide technical, programmatic, and

other market support activities. Finally, mandatory strategies may be useful to facilitate market transparency and help move mature measures into comprehensive use.

Achieving California's energy and climate goals requires widespread recognition of the tremendous benefits of more efficient energy use and accessible solutions that enable all Californians to live and work in comfortable, well-performing buildings. Regulatory solutions alone will not meet with sufficient success; true success will involve the widest array of participants applying creative, systemic solutions in the marketplace. Successful approaches will first and foremost meet the needs of building owners and occupants. In addition contractors, architects, local building officials, equipment manufacturers and suppliers, banks, and many others may touch any given building project, and must be part of the conversation around AB 758 implementation.

Government can and must help provide conditions conducive to responsible and sustainable growth of the marketplaces for energy-aware building upgrades. The California Energy Commission is committed, in primary partnership with the California Public Utilities Commission, the other relevant agencies, and our elected officials, to charting a positive, informed, and collaborative path toward realization of our shared vision: that all Californians have access to an economically and environmentally sound built environment for themselves and for future generations.

EXECUTIVE SUMMARY

For decades, California has led the nation and the world in promoting the efficient use of energy. Building and appliance energy efficiency standards coupled with a wide array of efficiency programs for utility customers have kept the state's per capita energy use relatively constant while use in the rest of the United States has increased by roughly 40 percent. These efforts reduce energy demand and the need for new power plants and imported energy, make businesses more competitive by lowering their operating costs, and reduce the costs of energy to consumers. Since the 1970s, building and appliance efficiency standards alone have saved Californians an estimated \$74 billion in electricity costs alone. Efficiency-related industries naturally complement the state's innovation-driven economy and create significant numbers of well-paying and local jobs. In sum, energy efficiency provides a broad and low-risk boost to California's bottom line.

In addition to being California's top priority resource to meet new energy needs, energy efficiency is a key strategy in the effort to mitigate the threat of climate change, which is expected to have significant and widespread impacts on the state's economy and environment. Estimates indicate that existing buildings are responsible for nearly one-fourth of the state's greenhouse gas emissions. There are ample opportunities for cost-effective energy savings in California's existing buildings given that 55 percent of residential and 40 percent of nonresidential buildings were constructed before California's landmark building standards were established. To take advantage of the untapped potential for further emissions and cost savings from these buildings, in 2009 Governor Schwarzenegger signed Assembly Bill 758 (Skinner, Chapter 470, Statutes of 2009) which directed the California Energy Commission, in collaboration with the California Public Utilities Commission and a diverse set of stakeholders, to develop a comprehensive program to achieve cost-effective energy savings in existing residential and nonresidential buildings.

The Energy Commission is developing the "Comprehensive Energy Efficiency Program for Existing Buildings" in three phases. During the first phase, projects and programs funded through the American Recovery and Reinvestment Act provided important lessons for designing and implementing future efficiency programs. The first phase also included public workshops held in 2012 to identify market needs and implementation challenges and develop the scope of the program and development of this *Draft Action Plan for the Comprehensive Energy Efficiency Program for Existing Buildings* which reflects the wide range of stakeholder input received throughout the scoping process.

The second phase of the program will focus on implementing the strategies in this plan to provide a strong and sustainable foundation for future energy efficiency efforts, address market needs, gaps, and imbalances, and transform the energy efficiency market. The third phase of the program will evaluate the appropriateness of regulatory approaches and whether the energy efficiency marketplace is mature enough to support them. There may be overlap between phases 2 and 3 for certain issues, such as the need for mandatory disclosure of building energy performance which could be considered sooner.

This *Draft Action Plan for the Comprehensive Energy Efficiency Program for Existing Buildings* suggests specific strategies to support growth in the energy efficiency market. The guiding principles underlying these strategies include:

- Increasing California’s energy resilience.
- Improving the economic performance and comfort of California’s buildings.
- Promoting innovation and cost-effective solutions.
- Creating a strong clean energy workforce.
- Monitoring and verifying program achievements.
- Aligning market incentives and energy policy goals.
- Making useful, actionable information available to all market actors.
- Expanding public education and outreach.

This plan proposes three categories of strategies to help California achieve its energy efficiency and greenhouse gas emission reduction goals: no regrets strategies, voluntary pathways, and potential mandatory approaches.

No regrets typically refers to a policy or action that either pays for itself in greater economic efficiency or is worth doing even without taking into account all the benefits it is expected to deliver. The **no regrets strategies** in this action plan will provide the necessary foundation to support and secure the benefits of future energy efficiency programs and efforts for existing buildings. No regrets strategies include:

- Data reporting and management to support effective program design, monitoring and evaluation, and stimulation of market evolution.
- Permitting support tools and education and code enforcement activities, which together will improve the energy performance of additions and alterations to existing buildings.
- Educational resources to motivate building owners and building managers to make energy efficiency upgrades.
- Workforce training and development to ensure measured scale-up of an appropriately skilled clean energy workforce.

Voluntary pathways are market support activities that build on past efforts. This plan encourages multiple pathways to achieve energy savings, including single efficiency measures, multiple measures, whole-building upgrades, and self-generation projects. Voluntary pathways include:

- Promoting a broad array of pathways to achieve energy upgrades for each building sector.
- Expanding outreach and engagement with the contracting industry and related building professionals.
- Developing standardized tools for benchmarking, energy assessments and audits, and building commissioning in commercial and public buildings.
- Focusing attention on small and medium commercial building upgrades.

- Enabling energy efficiency solutions for rental properties with special focus on disadvantaged communities.
- Working with local and regional governments to increase energy performance of public buildings while encouraging upgrades of privately owned buildings.
- Developing effective approaches to energy efficiency in property valuation in all existing buildings.
- Offering multiple innovative financing options for all building owners.

Finally, **mandatory approaches** could make the market more transparent and move mature measures into wider use. The need for mandatory approaches will depend on the results of a public process to evaluate their pros and cons. If mandatory approaches are determined to be desirable and feasible, the timing and content will depend on the results of the implementation of the no regrets strategies and voluntary pathways, and they will likely be implemented through regulations or statutes. Potential mandatory approaches could include:

- A statewide public disclosure program for the largest commercial and public buildings.
- Requiring the disclosure of energy performance and the completion of energy efficiency upgrades at appropriate trigger points in the life of all buildings, such as transactions that result in change of ownership, occupancy, or financing; replacement of major equipment; or building remodeling or renovation.

The success of the Comprehensive Energy Efficiency Program for Existing Buildings will depend on coordination and commitment among all stakeholders moving forward. The Energy Commission envisions creating an AB 758 Working Group to bring together key stakeholders and decision makers to examine issues such as defining the most appropriate metrics for gauging overall progress; data requirements such as content, structure, and reporting requirements; research efforts and lessons learned; evaluation, measurement, and verification of program results; cost-effectiveness criteria; and coordination among programs. The group should represent a wide array of industries and interested parties including state and public agencies, local and regional governments, industry representatives, efficiency program implementers and administrators, utilities, legislative leaders, and consumer advocates. In addition, the wider public will have input into efficiency programs at open meetings held periodically through the year in geographically diverse locations.

This *Draft Action Plan for the Comprehensive Energy Efficiency Program for Existing Buildings* will be the subject of three public workshops to be held in June 2013 in San Francisco, Los Angeles, and Fresno. Input from the broadest range of stakeholders is essential for identifying gaps and helping to fill them. In addition to feedback on the strategies themselves, the Energy Commission seeks input on which entities are best positioned to lead their implementation in practical terms, and on possible incremental sources of funding where it may be required. Information to support potential quantitative goals for the plan (such as number of buildings to upgraded, dollars invested, energy saved) will also be useful. After considering all information presented at the workshops and in written comments, the action plan will be finalized and considered for adoption by the Energy Commission in the fall of 2013.

CHAPTER 1: THE COMPREHENSIVE ENERGY EFFICIENCY PROGRAM FOR EXISTING BUILDINGS

The Comprehensive Energy Efficiency Program for Existing Buildings of 2009 was developed in response to Assembly Bill 758 (Skinner, Chapter 470, Statutes of 2009), which directs the California Energy Commission to develop and implement a program to achieve cost-effective energy savings in California's existing residential and nonresidential buildings. The mandate requires the Energy Commission to collaborate with the California Public Utilities Commission (CPUC) and California's stakeholders to develop a plan that incorporates diverse statewide input, coordinates programs, targets the various building sectors, and will bring forth large energy savings and greenhouse gas (GHG) emission reductions.

Energy efficiency upgrades have been cited as a key market where 25-40 percent energy savings can be achieved.¹ The Energy Commission's challenge is to create a program that supports the needs of the energy efficiency market without creating barriers for customers. This means encouraging multiple pathways to upgrades that take advantage of opportunities that may occur in the existing marketplace and provide opportunities for education and shaping of future upgrade projects.

In September 2012, the Energy Commission issued the *Comprehensive Energy Efficiency Program for Existing Buildings Scoping Report* and held workshops in October 2012 to receive public input.² This *Draft Action Plan for the Comprehensive Energy Efficiency Program for Existing Buildings* reflects that input along with staff analysis. The draft plan provides a roadmap of diverse strategies to achieve greater efficiency in existing buildings that encompasses all energy efficiency approaches in California. The draft plan will be the subject of three public workshops to be held in San Francisco, Los Angeles, and Fresno. In addition to stakeholder feedback on the proposed strategies in this plan, Energy Commission staff seeks input on program institutional structure, lead implementation responsibilities for each, and on potential sources of incremental resources where they may be needed. After incorporating stakeholder input, the action plan will be considered for adoption by the Energy Commission in the fall of 2013.

Contribution to California's Efficiency and Environmental Goals

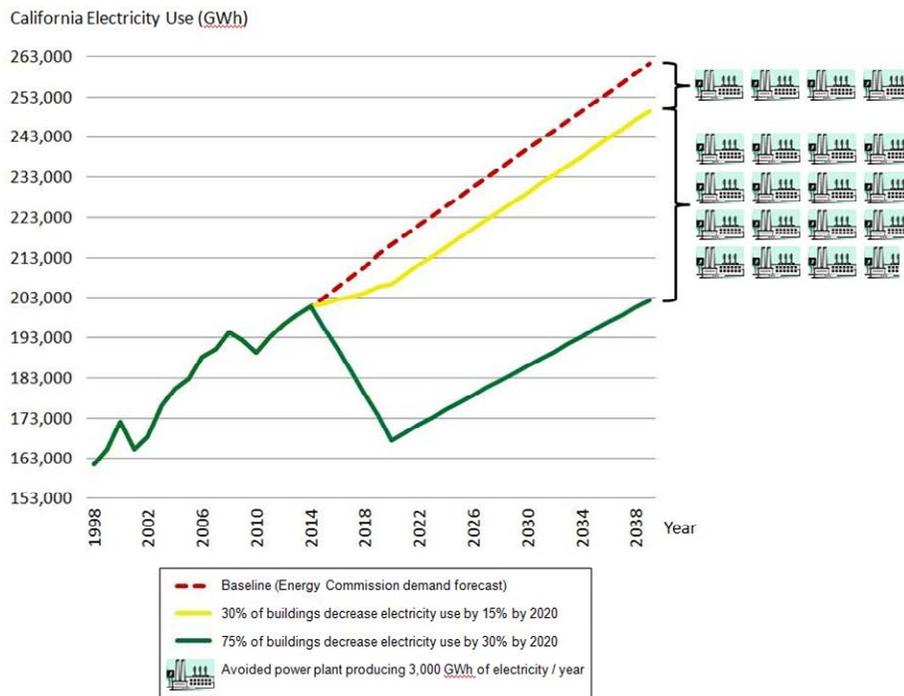
California continues to lead the nation in developing and implementing strong energy policies that promote energy independence, increase energy reliability and safety, reduce statewide greenhouse gas emissions, and create clean energy jobs. In addition to its myriad public and private benefits, the Comprehensive Energy Efficiency Program for Existing Buildings of 2009 is an essential component of achieving California's ongoing energy efficiency and environmental policy goals.

¹ These projections vary; for example, see Hannah Choi Grandade, Jon Creyts, Anton Derkach, et al, *Unlocking Energy Efficiency in the U.S. Economy*, McKinsey & Company, 2009.

² Martha Brook, Christine Collopy, Devorah Eden, et al, *Comprehensive Energy Efficiency Program for Existing Buildings Scoping Report*, California Energy Commission, Sacramento, August 2012, CEC-400-2012-015.

An overarching policy goal that precedes passage of AB 758 and affects all aspects of the state’s energy system is mitigating the threat of climate change by reducing GHG emissions. Governor Schwarzenegger’s Executive Order S-3-05 (June 2005) established a goal to reduce California’s GHG emissions below 1990 levels by 2020 and to 80 percent below 1990 levels by 2050. The Global Warming Solutions Act of 2006 (Assembly Bill 32, Núñez, Chapter 488, Statutes of 2006) subsequently codified the 2020 GHG emission reduction target. In response to the goals outlined in AB 32, the Energy Commission’s *2007 Integrated Energy Policy Report* recommended targeting energy efficiency as a key strategy to address climate change, observing that efficiency programs can reduce demand, make businesses more competitive, and allow consumers to save money and live comfortably.³ Figure 1 shows potential electricity savings compared to the Energy Commission’s baseline forecast (and the corresponding number of baseload power plants that might be avoided) under two different energy efficiency scenarios. The three scenarios shown assume a business-as-usual approach after 2020.

Figure 1: Potential Electricity Savings Under Different Energy Efficiency Scenarios



Source: California Energy Commission

Energy efficiency has long been California’s top priority resource to meet new electricity needs: this preference was formalized in the state’s first Energy Action Plan adopted in 2003.⁴ That plan, updated in 2005 and 2008, established a “loading order” of energy resources to meet the

³ Susanne Garfield, Carolyn Walker, and Yvonne Nelson, *2007 Integrated Energy Policy Report*, California Energy Commission, Sacramento, 2007, CEC-100-2007-008-CMF, <<http://www.energy.ca.gov/2007publications/CEC-100-2007-008/CEC-100-2007-008-CMF.PDF>>.

⁴ “State of California Energy Action Plan,” California Energy Commission, <http://www.energy.ca.gov/energy_action_plan/index.html>, accessed April 3, 2013.

state's growing electricity needs: first with energy efficiency and demand response, followed by renewable energy and distributed generation, and finally with clean fossil fuel sources and infrastructure improvements. Consistent with the loading order, in 2008 the California Air Resources Board's AB 32 *Climate Change Scoping Plan* recommended expanding and strengthening building and appliance standards and energy efficiency programs aimed at existing buildings, and set a target to reduce electricity consumption by 32,000 gigawatt hours (GWh) and natural gas consumption by 800 million therms (MMTh) by 2020 through energy efficiency improvements.⁵

The CPUC's 2008 *Long Term Energy Efficiency Strategic Plan* noted that long-term strategic planning is needed to achieve California's energy efficiency and GHG reduction goals.⁶ The plan called for reducing energy consumption in existing residential buildings by 40 percent by 2020 and for 50 percent of California's existing commercial buildings to be zero net energy by 2030. It also advised moving away from a "widget" based, single-measure approach and toward a "building-as-a-system" approach to achieve deep energy savings.⁷ In 2009, the CPUC approved energy efficiency savings targets for the 2010-2012 efficiency program portfolios for the state's three largest investor-owned utilities (IOUs) of 6,965 GWh of electricity and about 150 MMTh of natural gas.⁸ In 2012, the CPUC set savings targets for 2013-14 IOU efficiency programs at 3,965 GWh for electricity and 93.7 MMTh for natural gas.⁹

In addition to utility energy efficiency programs, California's building and appliance efficiency standards, established in the 1970s and regularly updated over time, are a crucial contributor to reducing GHG emissions in the electricity and natural gas sectors and to lowering the costs of energy to consumers. Since 1975, the standards have saved consumers roughly \$74 billion in reduced electricity costs and avoided the need to build six 500-megawatt power plants.^{10, 11} Going forward, the 2013 Building Energy Efficiency Standards are projected to save \$1.6 billion in energy costs over the next 30 years, while recently adopted appliance standards for battery chargers are expected to save \$300 million each year and eliminate a million metric tons of carbon emissions.¹²

5 California Air Resources Board, *Climate Change Scoping Plan: Pursuant to AB 32 the California Global Warming Solutions Act of 2006*, California Air Resources Board, Sacramento, 2008, p. 41.

6 California Public Utilities Commission, *California Long Term Energy Efficiency Strategic Plan: Achieving Maximum Energy Savings in California for 2009 and Beyond*, CPUC, San Francisco, September 2008, <<http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/eesp/>>.

7 California Public Utilities Commission, *California Long Term Energy Efficiency Strategic Plan: Achieving Maximum Energy Savings in California for 2009 and Beyond*, CPUC, San Francisco, September 2008, <<http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/eesp/>>.

8 California Public Utilities Commission, *Decision Approving 2010-2012 Energy Efficiency Portfolios and Budgets*, D.09-09-047, September 24, 2009, <<http://www.cpuc.ca.gov/NR/rdonlyres/A08D84B0-ECE4-463E-85F5-8C9E289340A7/0/D0909047.pdf>>, accessed May 24, 2013.

9 California Public Utilities Commission, *Decision Approving 2013-2014 Energy Efficiency Programs and Budgets*, D.12-11-015, November 15, 2012, <<http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M034/K299/34299795.PDF>>, pp. 57-58, accessed May 24, 2013.

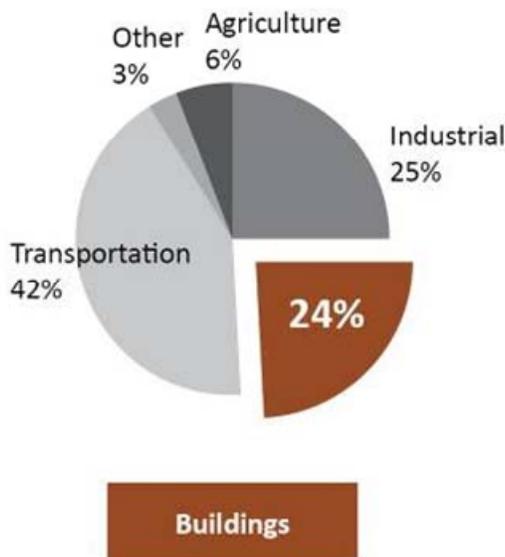
10 "California's Energy Efficiency Standards Have Saved \$74 Billion," California Energy Commission, <<http://www.energy.ca.gov/efficiency/savings.html>>, accessed April 13, 2013.

11 California Energy Commission, <http://www.energy.ca.gov/ab758/documents/AB-758_Program_Summary.pdf>.

12 Ibid; "California Energy Commission 2012 Accomplishments," California Energy Commission, <http://www.energy.ca.gov/releases/2013_releases/2012_Accomplishments.pdf>, accessed April 3, 2013; also see 2013

However, more than 55 percent of existing residential buildings and more than 40 percent of existing nonresidential buildings were built before standards were established. Existing buildings contribute nearly a fourth of the state’s GHG emissions (Figure 2)¹³ and represent significant untapped potential energy savings, underscoring the importance of a comprehensive program to target efficiency improvements in all existing buildings.

Figure 2: Greenhouse Gas Emissions by Sector



Source: California Energy Commission

Other state efficiency policies that complement AB 758 include the following:

- The Commercial Building Energy Use Disclosure Program of 2007 (Assembly Bill 1103, Saldaña, Chapter 533, Statutes of 2007) requires nonresidential building owners to disclose benchmarking data and ratings to prospective buyers, lessees, or lenders.
- The CPUC’s *Zero Net Energy Action Plan* and the *2012 Integrated Energy Policy Report Update* set zero net energy goals for new homes by 2020 and new commercial buildings by 2030.¹⁴
- Governor Brown’s 2010 Clean Energy Jobs Plan called for increased efficiency in existing buildings, as well as investment in California’s renewable technology and the creation of more than a half million green jobs.¹⁵

Building Energy Efficiency Standards, California Energy Commission,

<<http://www.energy.ca.gov/title24/2013standards/index.html>>, accessed April 3, 2013.

13 California Air Resources Board, *Climate Change Scoping Plan: Pursuant to AB 32, The California Global Warming Act Solutions Act of 2006*, 2008, p. 12; Martha Brook, B. Chrisman, P. David, T. Ealey, et al, *Draft Staff Report: Achieving Energy Savings in California Buildings*, California Energy Commission, Sacramento, July 2011, CEC-400-2011-007-SD.

14 California Public Utilities Commission, *California Energy Efficiency Strategic Plan. Zero Net Energy Action Plan: Commercial Building Sector, 2010-2012*, CPUC, San Francisco, 2011; California Energy Commission, *2012 Integrated Energy Policy Report Update*, California Energy Commission, Sacramento, 2012. CEC-100-2012-001-LCD.

15 “Brown Announces Clean Energy Jobs Plan,” Jerry Brown, June 14, 2010, <http://www.jerrybrown.org/Clean_Energy>, accessed April 20, 2013.

- Governor Brown’s Executive Order B-18-12 (April 2012) ordered state agencies to reduce GHG emissions by at least 10 percent by 2015 and 20 percent by 2020 below the 2010 baseline in public buildings, and requires agencies to participate in demand response programs to obtain financial benefits for reducing peak electrical loads.¹⁶

Program Goals

The CPUC’s *Long Term Energy Efficiency Strategic Plan* represented California’s first attempt at a strategic level action plan for all sectors, including industrial and agricultural, and also addressed integrated demand-side management of demand response and distributed generation. The AB 758 Comprehensive Energy Efficiency Program for Existing Buildings provides the opportunity to refresh and deepen that work as it relates to existing buildings, and to update the approach with current information and lessons based on recent experience.

The ultimate goal of the Comprehensive Energy Efficiency Program for Existing Buildings is to achieve meaningful energy savings in all building end uses.¹⁷ This effort includes multiple pathways to savings, respecting the fact that in practice, many building owners stagger improvement projects over time and that project scopes depend on many variables.¹⁸ Each encounter a customer has with a building upgrade professional (such as at the permitting office or with a contractor) can provide an opportunity or “on ramp” for a future efficiency project. Consistently available support can ensure that the right assistance and tools are available to building owners when they need them.

The program will provide the opportunity to encourage all building owners to include energy efficiency upgrades in their improvement projects. However, this approach will require the ability to identify and influence building projects that are occurring naturally in the marketplace. For example, there were an estimated 800,000 replacements of central air conditioners and furnace units in single family homes during the ARRA funding period.¹⁹ These represent natural opportunities to encourage building owners to move to higher efficiency equipment when they are making home improvements and repairing or replacing existing systems. Building owners must be made aware of these opportunities, while contractors and other market actors on the front lines must have the skills and knowledge required to advocate for and facilitate efficiency upgrades. By increasing the effectiveness of voluntary measures, the need for potential mandatory requirements in the future is reduced.

16 “Executive Order B-18-12,” Office of Governor Edmund G. Brown, Jr., <<http://gov.ca.gov/news.php?id=17508>>, accessed April 3, 2013.

17 Building end uses can include space heating, cooling, ventilation, lighting, water heating, cooking, and operation of appliances and office equipment.

18 See Merrian C. Fuller, Cathy Kunkel, Mark Zimring, et al, *Driving Demand for Home Improvements: Motivating Residential Customers to Invest in Comprehensive Upgrades that Eliminate Energy Waste, Avoid High Bills, and Spur the Economy*, Environmental Energy Technologies Division Lawrence Berkeley National Laboratory, Berkeley, September 2010.

19 See Michael Messenger, *Strategic Plan to Reduce the Energy Impact of Air Conditioners*, California Energy Commission, Sacramento, June 2008, CEC-400-2008-010; Richard Pulliam, *California Residential Energy Efficiency Market Share Tracking: HVAC 2005*, Southern California Edison, Rosemead, 2006; U.S. Department of Energy, *2011-06-06 Technical Support Document: Energy Efficiency Program for Consumer Products: Residential Central Air Conditioners, Heat Pumps, and Furnaces*, U.S. Department of Energy, Washington, D.C., 2011.

The *Long Term Energy Efficiency Strategic Plan's* goal of reducing energy consumption in existing residential buildings by 40 percent by 2020 is ambitious given the short time frame. The purpose of this draft action plan, in addition to implementing the requirements in AB 758, is to establish conditions conducive to a flourishing energy efficiency upgrade market using a diverse portfolio of approaches, a broad range of strategies and initiatives, and engagement with all market actors. The plan represents a roadmap that encompasses all relevant energy efficiency programs in the state, and encourages extensive coordination and leveraging for optimum outreach to local implementers, utilities, and existing building owners and tenants. The plan's coordinated strategies will seek to maximize energy efficiency for all building types, including single family and multifamily; small, medium, and large nonresidential buildings; and public buildings.

The strategies in the action plan are based on the following guiding principles:

- Promote cost-effective energy efficiency improvements that include innovative energy-efficient technologies and procedures and multiple pathways.
- Collect and manage the project-related and marketplace data that is essential for customers, contractors, and other market actors, as well as for program development and evaluation.
- Facilitate decision making by providing strong support to contractors and other building professionals who are the primary delivery channel for information and services to building owners and consumers.
- Build demand through expanded public outreach and education.
- Make available benchmarking and assessment tools, commissioning, and retrocommissioning and ratings at appropriate stages of a building's life cycle.²⁰
- Promote incentives such as rebate and financing programs where these produce energy savings at reasonable cost.
- Strengthen and streamline compliance with and enforcement of building codes and appliance or equipment standards.
- Create a strong clean energy workforce that can consistently perform quality work at reasonable cost.

Specific goals of this *Draft Action Plan for the Comprehensive Energy Efficiency Program for Existing Buildings* include the following:

- Ensure that reliable, relevant, and accurate data are identified, collected, and made available to policy makers, researchers, and the broadest possible groups of stakeholders. A critical step will be to define the appropriate levels of aggregation and standards for

²⁰ *Commissioning* is the process of ensuring that new buildings and their systems are designed, installed, functionally tested, and capable of being operated and maintained according to the owner's operational needs. *Retrocommissioning* is the application of the commissioning process to existing buildings.

privacy to be used in each of the relevant use cases, among them research, policy development, program design, business and investment due diligence, training, education, and outreach.

- Overcome the persistent problem of the failure of alterations to existing buildings to comply with state building energy efficiency standards.
- Enable data-driven approaches that draw from California’s immense well of creativity to identify opportunities and refine best practices. Leverage resources where possible to deliver effective marketing, education, and outreach to motivate building owners and decision makers to save energy by investing in energy efficiency upgrades whenever they alter an existing building.
- Develop a workforce that is well-matched in size and skills with industry needs and that will promote cost-effective energy efficiency upgrades during existing building alterations.
- Highlight opportunities for, and easy access to, multiple pathways for energy upgrades that recognize all existing energy efficiency efforts undertaken in California and encourage building owners to take additional steps to save energy whenever they consider building improvement projects. Ensure that building owners and decision makers have access to a standard set of tools and easily understood information to make decisions.
- Systematically recognize the relative energy efficiency of buildings and the presence of energy efficient features in the valuation of buildings to appropriately compensate energy efficiency investments and the energy efficiency upgrade industry.
- Provide easily accessible and affordable financing options for targeted sector upgrades by continuing existing successful financing programs and authorizing new ones.
- Conduct one or more public proceedings to consider requirements for benchmarking and public disclosure of energy use in California’s largest commercial and public buildings, and for disclosing energy performance ratings for all existing buildings and completing basic energy efficiency upgrades.

Program Phases

The Energy Commission is implementing the Comprehensive Energy Efficiency Program for Existing Buildings of 2009 in three phases. The first phase includes pilot projects that were funded under ARRA, developing and soliciting comments on the program’s proposed scope, and creating and finalizing the action plan. Phase II of the program will focus on implementing the roadmap, building partnerships, and market development. Prior to Phase III, it will be critical to assess which areas of the energy efficiency market have reached a level of maturity that will allow public consideration of a potential transition from voluntary program approaches to regulations, as appropriate, to accomplish the energy savings goals of the program.

The Energy Commission’s ARRA-funded pilots supported energy efficiency efforts through state, local, and regional programs, workforce training, and financing programs (Table 1). Funds were also used to implement an extensive and effective outreach program in 30 counties, coupled

with statewide and local public relations and marketing efforts. The ARRA pilots illuminated many of the gaps in the current energy efficiency marketplace, and lessons learned from the pilot programs are reflected in both the scoping report and the draft action plan.

Table 1: Assembly Bill 758 Pilot Programs

| Program Type | Program Name (ARRA Sub-Recipient) | Program Description | Contract Amount (\$ Million) |
|--|---|--|------------------------------|
| Targeted Commercial | EnergySmart Jobs (PECI) | Job creation, refrigeration case lighting | 18.2 |
| | Oakland Shines (QuEST) | HVAC and lighting controls | 5.1 |
| | Energy Technology Assistance Program (Energy Solutions) | HVAC and lighting controls | 6.7 |
| Energy Upgrade California Whole Building Program | Energy Upgrade California (Local Government Commission) | Statewide infrastructure for Energy Upgrade California | 21.1 |
| | Home Performance Program (SMUD) | Local Energy Upgrade California Program, Multifamily Pilot | 18.0 |
| | Retrofit Bay Area (Association of Bay Area Governments) | Local Energy Upgrade California program | 10.8 |
| | Regional Comprehensive Residential Retrofit Program (City of Fresno) | HERS Tune-Up Program | 2.9 |
| | Retrofit LA (Los Angeles County) | Local Energy Upgrade California program | 8.9 |
| | Energy Upgrade California in San Diego County | Local Energy Upgrade California program | 2.8 |
| | Moderate Income Sustainable Technology (CHF) | Below-market single family financing | 29.7 |
| Financing Upgrades | Retrofit LA (Los Angeles County) | Multi-sector financing programs | 11.0 |
| | Sonoma County Energy Independence Program (Sonoma County) | Contractor revolving loan fund to support Residential PACE | 3.2 |
| | Bay Area Multifamily Fund (San Francisco Mayor's Office of Housing) | Multifamily loan program | 0.6 |
| | City and County of San Francisco PACE | Commercial PACE | 1.6 |
| | City of Los Angeles PACE (Community Development Department of Los Angeles) | Commercial PACE | 4.9 |
| | Placer County PACE | Commercial PACE | 0.4 |
| | Energy Efficient State Property Revolving Fund (Department of General Services) | State-owned buildings finance program | 27.6 |

Source: California Energy Commission²¹

Energy Upgrade California, one of the successful ARRA pilots, was a collaboration between the Energy Commission, the CPUC, utilities, local governments, nongovernmental organizations, and the private sector to promote and finance energy efficiency and renewable energy projects for homes and businesses, reduce energy use, and train contractors and building professionals. After ARRA funding ended in April 2012, the CPUC chose Energy Upgrade California as the state's umbrella brand for an energy management center that will provide energy efficiency information and connections to programs, rebates, and financing to consumers and businesses.²²

²¹ Table 1 is a compilation of data provided by ARRA funding recipients. "ARRA AB 758 Pilot Programs," California Energy Commission, <<http://www.energy.ca.gov/ab758/pilot-programs.html>>, accessed April 2, 2013.

²² California Public Utilities Commission, *Decision Providing Guidance on 2013-2014 Energy Efficiency Portfolios and 2012 Marketing, Education, and Outreach*, D.12-05-015, May 18, 2012, <http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/166830.PDF>, accessed May 24, 2013; Energy Upgrade California, <<https://energyupgradeca.org/overview>>, April 2, 2013.

Program Implementation

This draft action plan proposes three categories of strategies to help California achieve its energy efficiency and climate change goals (Table 2), descriptions of which are provided below.

Table 2: Comprehensive Energy Efficiency Program for Existing Buildings Proposed Strategies

| No Regrets Strategies | Voluntary Pathways | Potential Mandatory Approaches |
|--|---|---|
| Strategies | | |
| <p>Data reporting and management to support private sector development and program design & evaluation.</p> <p>Permitting support and code enforcement for additions/alterations to existing buildings</p> <p>Education and outreach to building owners/managers</p> <p>Training to ensure skilled workforce</p> | <p>Provide broad choice of pathways to encourage more upgrades</p> <p>Engage contractors & other building professionals</p> <p>Develop standardized tools for benchmarking, energy assessments, & building commissioning</p> <p>Focus on small & medium commercial upgrades</p> <p>Provide efficiency solutions for rental properties with focus on disadvantaged communities</p> <p>Encourage public sector leadership</p> <p>Account for efficiency upgrades in property valuation</p> <p>Offer variety of innovative financing options</p> | <p>Disclosure program for largest commercial and public buildings</p> <p>Broad-coverage disclosure; completion of basic cost-effective upgrades</p> |

Source: California Energy Commission

No Regrets Strategies

No Regrets Strategies are foundational activities that will support and streamline current energy efficiency programs and markets, while ensuring conditions that enable significant growth in energy efficiency upgrades. These activities are unlikely to be conducted by the marketplace without state support and direction. They may require targeted funds from sources other than utility ratepayers, whose resources carry a statutory requirement for direct ratepayer benefits from such expenditures. The strategies will solidify the essential industry, program, outreach, and workforce infrastructure needed to improve current energy efficiency efforts and to implement other measures in the action plan.

No Regrets Strategies include:

- Data reporting and management to support private sector development and investment, and effective program design, monitoring and evaluation.
- Permitting support tools and code enforcement activities to improve compliance for additions and alterations to existing buildings.

- Educational resources to motivate building owners and building managers to make energy efficiency upgrades.
- Workforce training and development to ensure measured scale-up of an appropriately skilled clean energy workforce.

Voluntary Pathways

Voluntary Pathways are programmatic efforts that build on past efforts and channel existing resources. These efforts broadly fall under Phase II of AB 758 implementation. Phase II will require engagement of a much broader array of projects in the “upgrade” definition, and more explicit interagency coordination and information sharing. It will also require active and equal involvement of local governments and nonutility actors in program development and delivery. Improved targeting of efforts to each unique building sector will be important, as will developing and fine tuning specific program channels based on lessons learned. Finally, Phase II will include developing next-generation technical support and evaluation tools.

Voluntary Pathways are recommended strategies that support upgrade projects for all categories of building stock, and include:

- Promoting a broad array of pathways for each building sector to achieve energy efficiency upgrades during various stages in the life of the building. These pathways could incorporate a single measure, multiple measures, a whole-building approach, or self-generation projects.
- Expanding engagement with the contracting industry and related building professionals.
- Developing standardized tools for benchmarking, energy assessments and audits, and building commissioning in commercial and public buildings.
- Focusing attention on small and medium commercial building upgrades.
- Enabling efficiency solutions for rental properties with special focus on disadvantaged communities.
- Working with local and regional governments to increase energy performance of public buildings while encouraging upgrades of privately owned buildings.
- Developing effective approaches to include energy efficiency upgrades in property valuation.
- Offering multiple innovative financing options for all building owners.

Potential Mandatory Approaches

During Phase III of the program, a public process will take place to determine if mandatory approaches for achieving mass upgrades to existing buildings are desirable and feasible. If mandatory approaches are deemed necessary, they will be implemented by rulemakings or statutes.

Potential Mandatory Approaches could include:

- Requiring disclosure of energy performance and the completion of the most cost-effective energy efficiency upgrades at appropriate trigger points in the life of all buildings, such as transactions that result in change of ownership, occupancy, or financing; replacement of major equipment; or building remodeling or renovation.
- Establishing a statewide public disclosure program for the largest commercial and public buildings.

Detailed descriptions of individual strategies within the three categories are provided in Chapters 2-4.

Stakeholder Collaboration and Engagement

AB 758 offers many opportunities for those who implement California’s energy efficiency programs to coordinate efforts and leverage funds to achieve mutually beneficial goals. Transforming the energy efficiency marketplace will require partnerships among a diverse set of stakeholders. Throughout the roadmap development and implementation process, the Energy Commission will continue to collaborate with the following key stakeholders who are critical to the success of this action plan.

State Government

AB 758 requires the Energy Commission to work with other state agencies when developing the roadmap, including the CPUC, the Department of Real Estate, and the Department of Housing and Community Development. Government entities will need to coordinate program components to avoid duplication and ensure that programs are well-integrated.

Local Government

During implementation of ARRA funding programs, local government partners had success collaborating with local leaders, providing outreach and education to constituents, and developing programs to address issues in their communities. Similarly, the CPUC’s *Decision Providing Guidance on 2013-2014 Energy Efficiency Portfolios and 2012 Marketing, Education, and Outreach* found the “concept of local government regional pilots to be reasonable” and invited proposals from local governments to form regional energy networks.²³ The subsequent *Decision Approving 2013-2014 Energy Efficiency Programs and Budgets* creates two such networks – the Southern California Regional Energy Network and the Bay Area Regional Energy Network – whose budgets total \$71 million.²⁴

Building Officials

23 California Public Utilities Commission, *Decision Providing Guidance on 2013-2014 Energy Efficiency Portfolios and 2012 Marketing, Education, and Outreach*, D.12-05-015, May 18, 2012, <http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/166830.PDF>, accessed May 24, 2013.

24 California Public Utilities Commission, *Decision Approving 2013-2014 Energy Efficiency Programs and Budgets*, D.12-11-015, November 15, 2012, <<http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M034/K299/34299795.PDF>>.

Building officials include those involved in licensing, permitting, and code compliance, such as the California Building Officials and local building departments, Contractors State License Board, and the California Attorney General's Office. Building officials in particular play a leading role in motivating compliance with building standards and enforcing building codes; many of them will benefit from improved permitting tools and code-related technical support.

Utilities

Based on initial data submitted as part of the 2013 Integrated Energy Policy Report proceeding, Energy Commission staff estimate that in 2012 about 64 percent of California's electricity was provided by IOUs, primarily Pacific Gas and Electric Company, Southern California Edison, and San Diego Gas and Electric Company, while California's 45 publicly owned utilities provided nearly 24 percent.

The IOUs play a central role in delivering energy efficiency programs to their customers. AB 758 provides an opportunity to coordinate and leverage utility efficiency programs to reach a broader network of building owners. Utility partnerships with state, local, and regional governments must align with and complement other efforts for existing buildings to be upgraded at the scale needed to achieve the state's energy efficiency goals. IOUs will also play a key role in optimizing demand-side initiatives by providing customer information to program implementers and through marketing, education, and outreach efforts.

Publicly owned utilities are also vital to promoting energy efficiency programs to their customers. Public Utilities Code Section 9615 requires each publicly owned utility to meet its resource needs with all available energy efficiency and demand reduction resources that are cost-effective, reliable, and feasible.²⁵ They must also conduct an independent evaluation to measure and verify the energy efficiency savings and reduction in energy demand achieved by their energy efficiency and demand reduction programs. Since 2005, publicly owned utilities have been working collaboratively with the California Municipal Utilities Association, the Northern California Power Agency, and the Southern California Public Power Authority to measure the effectiveness of energy efficiency programs and periodically report program savings consistently and comprehensively.

Building Industry Professionals

Building professionals represent various aspects of the building alteration and upgrade industries. Building professionals include, but are not limited to, performance contractors, property managers, engineers, builders, energy consultants and raters, architects, and contractor associations. These actors play a key role in the success of upgrade programs for existing buildings by providing leadership and construction knowledge during program creation, implementation, and evaluation. They are the point of contact with the person, most often the building owner, who makes the choice to proceed with an energy efficiency upgrade.

Real Estate Professionals

²⁵ See "California Public Utilities Code, Chapter 5, Division 4.9," Official California Legislative Information, <<http://www.leginfo.ca.gov/cgi-bin/calawquery?codesection=puc&codebody=&hits=20>>, accessed April 30, 2013.

Real estate professionals represent those on the front line of building transactions – such as the sale or lease of existing buildings – and include agents, brokers, appraisers, multiple listing services, inspectors, title and escrow officers, and mortgage lenders. These entities are in a unique position to educate and inform buyers and sellers about the energy-related qualities of a building and opportunities to build improvements into the transaction. Voluntary adoption of energy efficiency upgrades would benefit from real estate industry professionals' understanding and facilitation of the sales, refinancing, and leasing processes.

Workforce, Education, and Training Partners

Workforce, education, and training partners are responsible for high quality, consistent education and training for professionals in the building industry. These entities include education and training providers, professional organizations, continuing education providers, labor unions, California Workforce Investment Boards, Employment Training Panels, California's Community Colleges, and others. The role of workforce, education, and training partners is to ensure that professionals trained in energy efficiency building science are knowledgeable about the building standards, comprehend how and when to obtain permits, and perform quality upgrade installations.

Property Owners, Tenants, and Managers

This category includes those who participate in the decision-making process, including single family and multifamily building owners, renters, and tenants;²⁶ small and medium commercial building owners; small business owners; large commercial building owners; and public and private property managers. Each in their own way evaluates the benefits and costs of investing in energy upgrades. Success of the project will depend on their ability to acquire the information needed for informed decisions and fruitful participation in upgrade programs.

Consumer Advocates and Environmental Organizations

Consumer, environmental, environmental justice, and other advocacy groups assist in the decision-making process by evaluating lessons learned and best practices; provide experiential knowledge about various and unique audiences; and provide tailored outreach, education, and advocacy to disadvantaged communities. These entities help promote demand for energy efficiency products and services based on the energy and environmental priorities of the communities and stakeholders they represent.

²⁶ In some lease arrangements, renters and tenants may have responsibility for building maintenance, improvements, and utility bills.

CHAPTER 2: NO REGRETS STRATEGIES

No Regrets Strategy 1: Data Reporting and Management

Overview

Stakeholders have identified the lack of access to relevant information data as a primary barrier to developing a self-sustaining energy efficiency marketplace.²⁷ Building owners, consultants, contractors, investors, efficiency program implementers, and even government agencies must often work with limited, inconsistent, and incomplete data on customer energy usage. They can also face challenges with accessing basic program information such as project costs, market penetration of efficiency measures, and estimated or actual energy savings. Data tends to be scattered among numerous uncoordinated entities – for example, utilities, consultants, research centers, and government agencies – that have different taxonomies and confidentiality rules.

Obtaining geographically specific information to support local and regional efforts can also be difficult. For all these reasons, access to relevant data is a basic requirement for developing cogent plans of action, yet remains elusive due to uncoordinated efforts and persistent asymmetry of access to the information that does exist.

Accurate energy performance data must be collected, organized, analyzed, integrated, and made appropriately available to market actors and decision makers.²⁸ Stakeholders have emphasized that energy performance data should be stored in a central location that is easily accessible, use a common taxonomy, and have a shared infrastructure.²⁹ Market actors have to be able to leverage and analyze existing data to develop business plans and provide information to consumers about the many opportunities for increased energy efficiency. Accurate information on projects, buildings, and energy consumption can meet many complementary market needs, such as assessing program effectiveness, developing sector- and location-specific outreach, making program and product offerings as effective as possible, and understanding market opportunities as part of potential investors' due diligence.

VISION FOR ENERGY PERFORMANCE DATA

The energy efficiency marketplace will be transformed with reliable information that can be used to characterize the marketplace and quantify the relationship between energy upgrades and measurable reductions in energy consumption.

“Data collection, organization, analysis, and delivery are actions needed to remove the market barriers to the adoption of energy efficiency in buildings.”

Walker Wright
SunRun

27 See Comments on the October 8 & 9, 2012 Workshops on the Comprehensive Energy Efficiency Program for Existing Buildings, California Energy Commission, Sacramento, October 8-9, 2012, especially Docket TN-68008, <http://www.energy.ca.gov/ab758/documents/2012-10-08-09_workshop/comments/>.

28 *Energy performance data* refers to energy use data and the key characteristics of building energy systems that jointly provide information on the opportunities and benefits of energy efficiency.

29 Comments on the October 8 & 9, 2012 Workshops on the Comprehensive Energy Efficiency Program for Existing Buildings, California Energy Commission, especially Dockets TN-68008, TN-68034, TN-97993, TN-67991, and TN-68018.

Consumption data in particular enable development of actionable information for energy consumers, as well as to technology developers, local governments, builders, and other market actors. One example of effective customer engagement is a partnership currently underway between National Grid, Xcel Energy, and the National Renewable Energy Laboratory to support targeted customer outreach with analysis of the energy performance of every building in the utilities' service territories.³⁰

Data privacy is a perennial concern and merits serious attention and controls. There are many ways to protect customer identity while still getting data at the level of detail required for effective decision support. California's energy agencies are committed to ensuring privacy and customer confidentiality, and to working closely with all stakeholders to develop and apply effective data security protocols.

"[Data] collection should be centralized and accessible to multiple stakeholders, and support the development and adoption of national standards for data collection, calibration, and data transfer protocols."

Conrad Asper
Efficiency First California

Stakeholders have especially highlighted the need for access to energy performance data.³¹ Building owners need such data to make informed decisions about energy efficiency upgrades. Performance data at the community and neighborhood level would also assist with developing cost-effective products and programs to reach areas with the greatest potential for energy efficiency upgrades.³² Policy makers and agencies need granular and up-to-date performance data, for example, on energy consumption, program participation, and project outcomes, to accurately assess trends in the market. Analyses supported by project-related data will help policy makers improve the state's energy planning efforts and evaluate the effectiveness of efficiency programs. Finally, more precise understanding of actual energy savings impacts will attract private capital to the most attractive efforts and enhance competition within the energy efficiency marketplace.

The California Solar Initiative (CSI) California Solar Statistics data program is an excellent example of a centralized and accessible data repository that is widely used by policy makers, clean energy businesses, and consumers interested in solar energy.³³ The CSI database was developed using detailed input from industry, and is publicly available. Given energy efficiency's place at the top of California's loading order, there should be a similar – indeed, much more robust – statewide data clearinghouse for building energy efficiency

"It is crucial that AB 758 programs both rely on and produce detailed and transparent data. Both aggregate and project-level data can play a key role in driving market innovation."

Sachu Constatine
California Center for
Sustainable Energy

30 "Energy Analysis," National Renewable Energy Lab, <<http://www.nrel.gov/analysis/partnerships.html>>, accessed March 2013; "Business New Construction: Case Study – Bethke Elementary School – Fort Collins, Colorado," Xcel Energy, p. 2, <<http://www.xcelenergy.com/staticfiles/xcel/Marketing/Managed%20Documents/co-bus-EDA-Bethke-Elementary-Success-Story.pdf>>, accessed April 3, 2012; Database of State Incentives for Renewables and Efficiency, <www.dsireusa.org>, accessed April 3, 2013.

31 Comments on the October 8 & 9, 2012 Workshops on the Comprehensive Energy Efficiency Program for Existing Buildings, California Energy Commission, especially Dockets TN-68034, TN-97967, TN-68025, TN-68008, and TN-68019.

32 "Building Technologies Office (Building Performance Database)," U. S. Department of Energy, <<https://www1.eere.energy.gov/buildings/commercial/bpd.html>>, accessed January 28, 2013.

33 "California Solar Initiative," Go Solar, <<http://www.gosolarcalifornia.ca.gov/csi/index.php>>, accessed December 20, 2012.

programs.

California's energy agencies recognize the importance of accurate information for developing and implementing sound policy. The Energy Commission has developed a data warehouse with detailed information on the ARRA-funded single family projects. The CPUC also has ongoing efforts to establish a data clearinghouse for efficiency programs and energy consumption data.³⁴

The CPUC also maintains detailed data on all energy efficiency projects for evaluation, measurement, and verification (EM&V). While its primary use has been for EM&V of utility portfolio programs, with improved accessibility and data frequency the dataset could also be useful in designing and targeting a wide array of efficiency programs. The EM&V dataset also represents a significant effort by the IOUs and the CPUC's Energy Division to devise standard protocols for tracking data, naming measures, and classifying building types and could be leveraged for a broader statewide effort to standardize energy efficiency data.

These existing agency efforts are complementary, and the Energy Commission and CPUC will closely collaborate to maximize their utility within a statewide existing building effort. Collaboration and cooperation with POUs will also be necessary to ensure true statewide coverage. Further, the Energy Commission will consider using its existing authority under the Public Resources Code to develop solutions that ensure recurring, systematic reporting of relevant energy data, and its appropriate availability, in support of the growth and development of the energy efficiency marketplace.

Other efforts throughout the state to analyze energy use at the community level include "heat maps" (Figure 3)³⁵ produced by regional organizations in Los Angeles, Irvine, and Fresno that highlight areas with higher or lower energy use.³⁶ This type of mapping and related analysis should ideally be done at the statewide level but will require standardized and consistent data collection.

Key Strategies

NR 1.1: *Collect, organize, and make energy performance data available to market participants.*

The first step in building a complete database of energy performance data will be to identify available data sources for buildings in California, followed by determination of the specific type of data that needs to be collected to support the goals of AB 758 and the efficiency marketplace. The Energy Commission will collaborate with the CPUC, utilities, local and regional

34 Audrey Lee and Marzia Zafar, "Energy Data Center," Briefing Paper, CPUC, San Francisco, September 2012, <<http://www.cpuc.ca.gov/NR/rdonlyres/8B005D2C-9698-4F16-BB2B-D07E707DA676/0/EnergyDataCenterFinal.pdf>>.

35 Joseph Oldham, "Home Energy Tune Up Program," presentation at Central California Local Government Partnership, Santa Barbara, September 25, 2012.

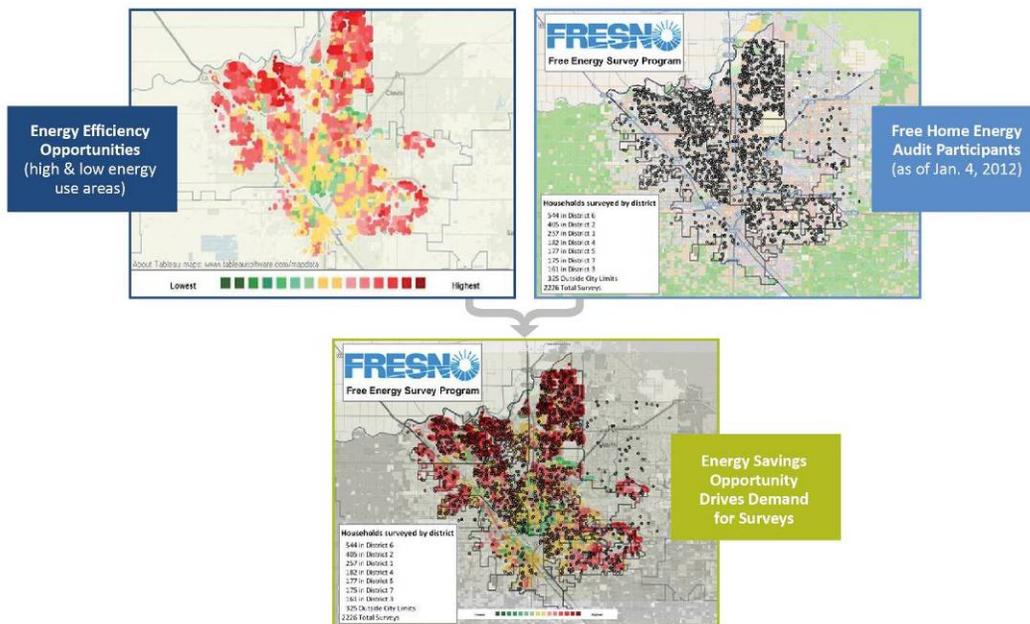
36 Comments on the October 8 & 9, 2012 Workshops on the Comprehensive Energy Efficiency Program for Existing Buildings, California Energy Commission especially Docket TN-67983; Meredith Reynolds, "City of Irvine GIS-Based Energy Data Pilot Project, presentation at CPUC Energy Data Workshop, San Francisco, January 15-16, 2013, <ftp://ftp.cpuc.ca.gov/13011516_EgyDataWorkshop/Panel%20%20Meredith%20Reynolds%20%5BRead-Only%5D%20%5BCompatibility%20Mode%5D.pdf>; Joseph Oldham, "Home Energy Tune Up Program," Central California Local Government Partnership Presentation, Santa Barbara, September 25, 2012.

governments, and other interested parties to coordinate data collection efforts, including frequency of data collection, data storage and access issues, and data security. Critical elements of the process will be protection of customer confidentiality, data structure, and data security.

Key Initiatives

1. Identify available data sources for providing relevant information on California’s existing buildings; identify data categories to be collected and stored; and determine the data structure(s) and resources needed to collect, store, and analyze the data.
2. Develop requirements and protocols to ensure customer confidentiality and data security.
3. Develop a data collection process accessible to all market actors consistent with data security protocols.
4. Conduct a rulemaking to update existing regulations for regular collection and storage of policy-relevant data, and for providing appropriate access to data for program implementers, researchers, and the public.
5. Recommend that all energy efficiency programs providing ratepayer- or taxpayer-funded benefits require program participants to release sufficient data, including energy consumption pre- and post-upgrade, for program evaluation.

Figure 3: Energy Savings Opportunity Drives Demand for Audits



Source: City of Fresno

NR 1.2: *Support and promote innovation by providing access to and analysis of energy performance data.*

Data is critical to the development of software applications to analyze energy consumption, such as the heat maps discussed above. Local and regional governments can use these maps to overlay information specific to the economic conditions in their communities and to assess localized barriers to program participation.³⁷ Another example is the industry-led “Green Button” effort, implemented in response to a challenge by the White House.³⁸ This streamlined program for customers and third-party energy management application developers shares customer-specific energy use data to enable customer-directed energy management applications and tools.

Tools like these hold enormous potential for helping customers understand their particular context and make informed decisions. At the same time, tools must meet a minimum standard for accuracy. Creating a voluntary software validation and certification process to establish standards for identifying energy consumption end uses in homes and businesses, building characteristics information, and occupant behavior will increase consumer trust in the information provided by the marketplace and help software vendors market their products.

“Local governments can help overlay on maps for their areas information specific to local economic conditions in the communities, to provide a better understanding of barriers that inhibit large-scale energy efficiency [upgrade] participation.”

Jody London
Local Government Sustainable
Energy Coalition

Key Initiatives

1. Develop residential and nonresidential building energy performance benchmarking applications and create applications and tools to analyze energy use and manage financial risk.
2. Create and manage a voluntary software validation and certification process to build consumer confidence in private vendor software tools that analyze energy use data.

NR 1.3: *Use the data collected in NR 1.2 to establish baselines, metrics, evaluation approaches, and communication mechanisms to assess and publicize progress made to improve the energy efficiency of existing buildings.*

The market needs energy performance assessment and benchmarking tools to support informed decision-making. Data needs to be collected to create metrics that can be tracked over time, such as energy cost per square foot by climate zone. Accurate measurement is also

37 Comments on the October 8 & 9, 2012 Workshops on the Comprehensive Energy Efficiency Program for Existing Buildings, California Energy Commission, especially Dockets TN-67983 and TN-68019.

38 Green Button Connect, <<http://www.greenbuttonconnect.com/>>, accessed January 3, 2013;

<<http://www.whitehouse.gov/blog/2011/09/15/modeling-green-energy-challenge-after-blue-button>>, accessed June 5, 2013.

needed of actual post-upgrade energy savings to demonstrate program progress.³⁹ One possibility is the use of public “scorecards” on energy use, upgrades, and other metrics at the local or regional level. Establishing these metrics will require coordination with the CPUC’s *Energy Efficiency Strategic Plan Update*.

Key Initiatives

1. Collect data and compute metrics that measure the current energy performance of existing buildings across the state.
2. Collect data and compute metrics that measure the improvements made to the energy efficiency of existing buildings over time.

Potential Stakeholders

Federal and state agencies; California’s utilities; local and regional governments; nonprofit organizations; and private industry.

³⁹ Comments on the October 8 & 9, 2012 Workshops on the Comprehensive Energy Efficiency Program for Existing Buildings, California Energy Commission, especially Dockets TN-68025 and TN-68008.

No Regrets Strategy 2: Support for Standards Compliance and Enforcement

Overview

Stakeholders have noted that insufficient compliance and enforcement are major barriers to transforming the energy efficiency marketplace.⁴⁰ California's building efficiency standards are some of the most advanced in the United States. The latest update, the *2013 Building Energy Efficiency Standards*, is projected to save Californians \$1.6 billion in energy costs over the next 30 years.⁴¹ However, this savings potential will be achieved only if buildings actually meet the standards.

VISION FOR COMPLIANCE AND ENFORCEMENT

The foundation of California's energy efficiency future relies on stakeholder collaboration to achieve consistent compliance and enforcement.

In addition to addressing newly constructed buildings, California's building standards specify requirements for specific projects that alter existing buildings. Enforcement agencies review compliance with energy efficiency codes and standards and issue permits if buildings comply. The State of California requires contractors to obtain building permits as a condition of their license, and local laws designed to protect consumers also require contractors to obtain permits. Unfortunately, these legal requirements are not always met. For example, an estimated 90 percent of all residential central heating, ventilation, and air-conditioning (HVAC) replacements are being done without a permit, making it difficult for enforcement agencies to oversee and confirm compliance with the standards.⁴² While alterations to HVAC systems without permits are a significant problem, failure to comply with the standards also likely occurs with many other alterations including reroofing and installation of water heaters and windows.

"[The] vast majority of replacement HVAC systems are not installed under a building permit. ... The total number of permits issued for HVAC in Sacramento in 2011 was 1925. This is in a city where at least 10,000 air conditioners were replaced in that year based on normal replacement rates. It is clear that enforcing the existing building standard for existing HVAC systems would reap huge positive results."

John Proctor
Proctor Engineering Group, Ltd.

In 2008, the Energy Commission published a report that included recommendations for overcoming the compliance issue with central HVAC replacements.⁴³ The report estimated 130 megawatts of additional peak demand reduction could be achieved annually with 90 percent permitting and proper

40 Comments on the October 8 & 9, 2012 Workshops on the Comprehensive Energy Efficiency Program for Existing Buildings, California Energy Commission, especially Dockets TN-68200 and TN-68008.

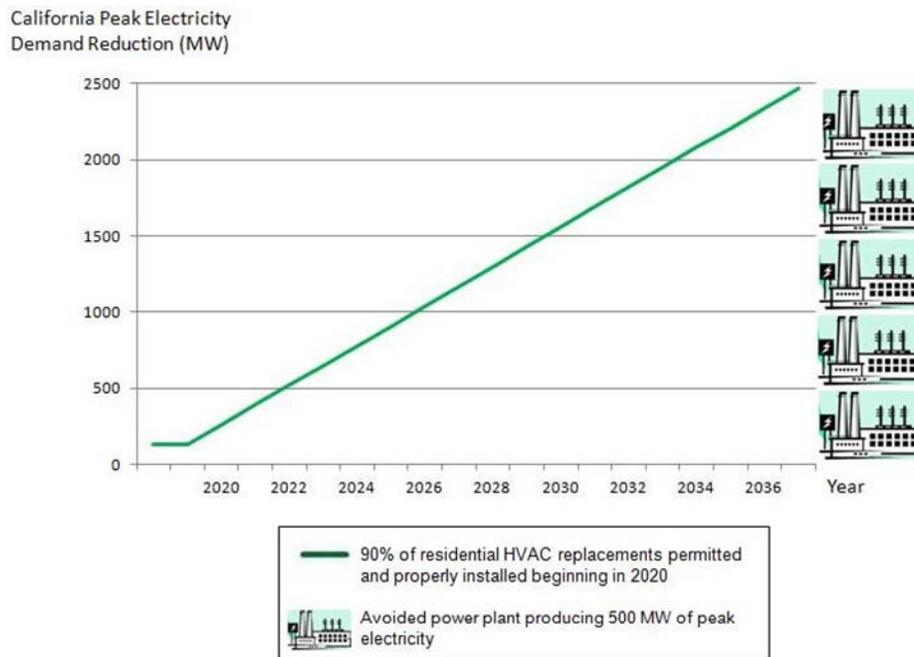
41 California Energy Commission, "California Energy Commission 2012 Accomplishments," <http://www.energy.ca.gov/releases/2013_releases/2012_Accomplishments.pdf> accessed April 16, 2013.

42 Michael Messenger, *Strategic Plan to Reduce the Energy Impact of Air Conditioners*, California Energy Commission, Sacramento, 2008, CEC-400-2008-010, p. 7-8, <<http://www.energy.ca.gov/2008publications/CEC-400-2008-010/CEC-400-2008-010.PDF>>.

43 Ibid, p. 7-8.

installation of replacement HVAC equipment (Figure 4).⁴⁴ To further address this issue, the CPUC included HVAC installation performance and permitting as one of the “Big Bold Initiatives” in its *2008 California Long Term Energy Efficiency Strategic Plan*.⁴⁵

Figure 4: Peak Savings From 90 Percent Residential HVAC Changeout Compliance



Source: California Energy Commission⁴⁶

Alterations in existing buildings continue to take place without building permits despite collaborative efforts between the Energy Commission, the CPUC, utilities, the Western HVAC Performance Alliance, the Compliance Improvement Advisory Group, the California Professional Association of Specialty Contractors, the Contractors State License Board, and California Building Officials. This is due to many factors including the cost of permits and Home Energy Rating System verification, the mistaken perception that permits do not add value – often traceable to lack of knowledge about the code itself – and underfunded enforcement programs. There exists an “underground economy” that favors contractors and other market actors who choose not to pursue the path of compliance.⁴⁷ Stakeholders point out that this disadvantages contractors who obtain permits and comply with the standards and hinders market competition, perpetuating the problem.⁴⁸

⁴⁴ Ibid, p. 31.

⁴⁵ CPUC, *California Long Term Energy Efficiency Strategic Plan*, p. 57.

⁴⁶ Ibid, p. 31.

⁴⁷ “The Underground Economy in California – What Does it Cost?” California Employment Development Department, <http://www.edd.ca.gov/Payroll_Taxes/Underground_Economy_Cost.htm>, accessed March 14, 2013.

⁴⁸ Comments on the October 8 & 9, 2012 Workshops on the Comprehensive Energy Efficiency Program for Existing Buildings, California Energy Commission, especially Dockets TN-68200 and TN-67906.

To deal with the imbalance within the marketplace, statewide permitting and compliance studies must be conducted to evaluate the extent to which compliance is being achieved and, where it is not, to what extent the problem is linked to permitting failures. These studies will require cooperation and collaboration among various stakeholders and would logically compare permit information with the actual equipment and products sold in California.

Once the extent of the problem is understood, programs should be designed to assist local government efforts, provide increased support, and encourage compliance. Local governments must also have the necessary tools to take a more active role in prioritizing compliance with and striving to exceed the standards. These efforts should include robust, targeted, accessible, and local training programs for contractors, enforcement agency staff, homeowners, and other market actors on the requirements in the standards and the value of compliance. Consumer awareness about the value of and cost-savings associated with properly permitted efficiency upgrades would increase the demand for contractors who comply with the standards. One possible approach could include providing incentives for consumers who submit a “certificate of verification” when an alteration project has received final permit sign-off.

Stakeholders have also stressed that the permitting process is time-consuming and inconvenient.⁴⁹ To make permitting simpler and more convenient, California could make available to local jurisdictions a voluntary opt-in online permitting system to provide a low-cost, user-friendly approach to obtaining building permits associated with energy efficiency upgrades. State and local governments would work together to determine which of the available systems, if any, is most advantageous, efficient, and affordable. Such an online permitting system could include electronic generation and handling of compliance forms and, in the near future, support for handheld networked devices for compliance and enforcement staff.

One example of an effort to improve permitting processes is Simply Civic, funded under the United States Department of Energy’s (U.S. DOE) SunShot Incubator Program, which is streamlining permitting, inspection, and interconnection of solar energy systems through a modular online application available to 18,000 jurisdictions nationally. The tool will allow installers to track the status of solar projects in real-time while making it faster and easier to process paperwork.⁵⁰ Another example is a pilot program in Las Vegas Home Depot stores that allows homeowners and contractors to obtain permits for items such as replacement of water heaters, heating, and air-conditioning units at kiosks located within the stores (Figure 5).⁵¹

Incentives and clear consequences for noncompliance are both needed to improve permitting rates and achieve uniform compliance with the standards. The Energy Commission proposes to

49 Comments on the October 8 & 9, 2012 Workshops on the Comprehensive Energy Efficiency Program for Existing Buildings, California Energy Commission, especially Dockets TN-67991, TN-67993, and TN-68200.

50 U.S. Department of Energy, http://www1.eere.energy.gov/solar/sunshot/incubator_projects.html, accessed June 4, 2013.

51 “Permitting at Home Depot to streamline construction in Las Vegas,” *Las Vegas Review-Journal*, September 8, 2012 <<http://www.lvrj.com/business/permitting-at-home-depot-to-streamline-construction-in-las-vegas-169017976.html>>, accessed March 14, 2013.

collaborate with the Contractors State License Board, local governments, and other state agencies to identify contractors who are conducting the bulk of unpermitted work.⁵²

Figure 5: Permit Kiosk in Home Depot Store



Source: Home Depot

Key Strategy

NR 2.1: *Implement solutions to increase compliance with and enforcement of California's Building Energy Efficiency Standards for alterations to existing buildings.*

Failure to achieve high rates of compliance will inhibit the transformation of California's energy efficiency marketplace. Market development can occur only if contractors who obtain the proper permits and comply with the standards are not forced to compete with those who do not.

Key Initiatives

1. Conduct statewide studies to understand and monitor the extent to which permits are being obtained and compliance is being achieved.
2. Develop approaches to track and determine whether specific equipment sold and installed in California complies with state and local requirements.
3. Educate and train contractors, building departments, homeowners, and other market actors on the standards for specific alterations and the cost and operational benefits of compliance. Provide permanent, ongoing training as conveniently as possible throughout the state.

⁵² "Underground Economy Targeted in Two-Day Statewide Sweep & Sting Operation," Department of Consumer Affairs Contractors State License Board, Press Release, June 23, 2011, <<http://www.cslb.ca.gov/generalinformation/newsroom/pressreleases/pressreleases2011/News20110623.asp>>, accessed March 14, 2013.

4. Develop or adopt a statewide online permitting system for local building departments and contractors. Collaborate with manufacturers, distributors, and retailers to encourage contractor and consumer participation in the online permitting system and tools.
5. Collaborate with state and local agencies to actively enforce state building standards and establish clear consequences for noncompliance.
6. Encourage local governments to establish initiatives to improve enforcement of the state building standards and local energy and green ordinances. Provide nonmonetary incentives to market actors to increase the motivation to obtain permits and comply with current energy efficiency requirements.

Potential Stakeholders

Federal and state agencies; California utilities; local and regional governments; local building departments; enforcement agencies, building industry professionals, equipment manufacturers, distributors, and retailers; and building owners.

No Regrets Strategy 3: Foundational Marketing, Education, and Outreach Resources

Overview

Consumers make decisions on energy efficiency expenditures based on many factors beyond costs.⁵³ These factors can include social context, lifestyle, regional differences, cultural norms, habits, and psychology. Motivating consumers to make efficiency upgrades to existing buildings will therefore require a portfolio of demand-side management programs, information targeted to specific audiences, and coordinated strategies.

Marketing, education, and outreach (ME&O) will play a vital role in transforming the energy efficiency market. ME&O should convey the benefits of efficiency upgrades, including cost-effectiveness, to building owners and consumers. The challenge will be to deliver easily accessible, articulate, targeted, and relevant information about energy and nonenergy benefits while emphasizing the importance of installing quality and safe upgrades and obtaining the necessary permits.

The foundation for statewide residential ME&O already exists. The Energy Upgrade California Program was created in 2010 and represented an unprecedented investment in and collaboration among state and local government and utilities. As part of the program, the Energy Commission invested millions of dollars of ARRA stimulus funds in the development of a statewide ME&O infrastructure and local ME&O efforts. Local governments leveraged U.S. DOE grants to pilot local Energy Upgrade California programs and to fund additional ME&O.⁵⁴ California's IOUs also contributed marketing efforts toward ratepayers.

Building on the ARRA efforts, the CPUC decided to expand the Energy Upgrade California brand from a residential program to a statewide umbrella brand for energy information and encouraging demand-side management actions, including demand response and distributed generation, by all residential and small business consumers.⁵⁵ The Energy Upgrade California

VISION FOR MARKETING, EDUCATION & OUTREACH

Demystify and transform the energy efficiency marketplace through well-communicated and targeted marketing, education and outreach.



53 See Loren Lutzenhiser, et al, *Behavioral Assumptions Underlying California Residential Sector Energy Efficiency Programs*, CIEE, Berkeley, 2009, <<http://uc-ciee.org/behavior-decision-making/1/378/99/nested>>; Michael J. Sullivan, *Behavioural Assumptions Underlying Energy Efficiency Programs for Businesses*, CIEE and CPUC, White Paper, Berkeley, 2009, <<http://uc-ciee.org/behavior-decision-making/1/375/99/nested>>; also see Fuller, et al, *Driving Demand for Home Improvements*.

54 Energy Upgrade California, <https://energyupgradeca.org/about_us>, accessed March 11, 2013.

55 California Public Utilities Commission, *Decision Providing Guidance on 2013-2014 Energy Efficiency Portfolios and 2012 Marketing, Education, and Outreach*, D. 12-05-015, May 18, 2012, <http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/166830.PDF>, accessed May 24, 2013.

Whole House Program renamed as the Energy Upgrade Home Upgrade Program will continue to exist as a subprogram under the statewide brand.

The CPUC gave statewide Energy Upgrade California ME&O management duties to the California Center for Sustainable Energy (CCSE), a nonprofit organization based in San Diego. CCSE developed the statewide *2013-2014 Energy Upgrade California Marketing Plan*, which analyzes challenges and best practices from ARRA-funded pilot programs and offers multifaceted marketing strategies.⁵⁶ Support for Energy Upgrade California brand will need to continue beyond the 2013-2014 efficiency program cycle. A CPUC decision covering the marketing plan, budget, and other items for Energy Upgrade California is expected during the summer of 2013.

A successful ME&O effort will require targeted market research to better understand consumer attitudes and knowledge along with an assessment of current efficiency programs offered by utilities, state agencies, and local governments. Research has already identified segments of the population most likely to take action when targeted messages are delivered through outreach and education.⁵⁷ Targeted messaging can now be developed to increase public awareness and maximize message distribution. Investment in outreach and marketing will allow new strategies and tactics to be directed at those most likely to understand the cost-effectiveness of reducing energy use and to take action by investing in building upgrades.

[ME&O] efforts are very important to convey to the public the urgency, visibility and validity of the power and benefits of energy efficiency.”
Tiger Adolf,
Building Performance Institute

Increasing access to consistent and reliable data, discussed in No Regrets Strategy 1, will make targeted messaging easier and more effective. Tools to support this goal need to be encouraged and aggressively promoted so that consumers understand their value and take advantage of them in ever-greater numbers. Statewide ME&O efforts, program implementers, program administrators, local governments, and utilities will need to work together for this to happen at the scale needed.

ME&O efforts will also need to support performance contractors as “change agents” – those who help change traditional ways of thinking – to influence building owners when they considering upgrades. Contractors need accurate, complete, and timely information to explain benefits of energy upgrades to building owners and decision makers. In addition, messaging must convey that there are multiple pathways for upgrades; while whole-building upgrades

56 California Center for Sustainable Energy, *Energy Upgrade California: 2013-2014 Draft Marketing Plan for 2/26/13 Workshop Discussion*, San Diego, February 2013.

57 The population segment most likely to take action was characterized as “Leading Achievers,” typically older (45-64) homeowners who are affluent, highly educated, and toward the liberal end of the political spectrum. Opinion Dynamics Corporation, *Market Segmentation Findings*, CPUC, San Francisco, December 10, 2009, <<http://www.cpuc.ca.gov/NR/rdonlyres/9A3B6444-96AD-4A6D-A392-7588761C3A9D/0/OpinionDynamicsFinalSegmentationReport.pdf>>.

achieve the highest energy savings, they may not be right for all building owners. Contractors can help consumers develop a long-term upgrade plan and will benefit from training to improve their sales techniques and increase their knowledge of financing options.

Effective ME&O efforts will depend on collaboration among all parties with an interest in energy-efficient homes, businesses, and public buildings. Informed consumers, business owners, and property or facility managers are more likely to invest in energy efficient upgrades when they have access to relevant, credible, and easily understood information. Furthermore, they will be more likely to act when information is transmitted through the proactive efforts of contractors, architects, utilities, local and regional governments, community-based organizations, and satisfied customers. Going forward, future ME&O activities can be improved through “best practices” learned from existing and pilot outreach programs.

“The industry recommends the market transformation effort convey a sense of urgency about the environmental and economic benefits of taking action, as well as the environmental and economic consequences of inaction.”

Conrad Asper
Efficiency First California and
California Building Performance
Contractors Association

Key Strategies

NR 3.1: *Use marketing, education, and outreach to motivate building owners and managers to take immediate action to make energy efficient improvements.*

ME&O is critical to convey to the public the urgency and benefits of energy efficiency, which will lead Californians to take action to upgrade buildings, comply with building standards, and contribute significantly to the state’s energy and environmental goals. Current levels of ME&O need to be increased, leveraged, and expanded to support energy efficiency programs for all building types and sectors.

Key Initiatives

1. Conduct ongoing market research to better understand customer attitudes toward energy efficiency and incorporate the results into outreach and marketing messages, tactics, and tools to increase public awareness.
2. Target outreach and marketing efforts by prioritizing buildings using the highest amounts of energy. Target other priority customer segments identified by using future data and best practices analyses.
3. Support the expansion of the Energy Upgrade California Program as the state’s umbrella brand for all residential and small business energy management. Continue the Energy Upgrade California Home Upgrade and Advanced Home Upgrade Program as stand-alone programs.
4. Continue statewide collaboration and leverage the efforts of agencies, local and regional governments, utilities, and other market actors’ resources for ME&O efforts. Share sector-specific data, information, and resources among partners for broader customer reach and program scale.

5. Support contractors with the tools to communicate upgrade benefits, including cooperative marketing opportunities
6. Use “best practices” from existing and pilot outreach programs to inform the development and structure of ME&O programs, and leverage educational and marketing activities in conjunction with workforce development, compliance, enforcement, data collection, financing, and property valuation programs.
7. Continue a statewide approach to ME&O support, coordination, and management of the Energy Upgrade California brand.

NR 3.2: *Conduct ME&O as part of complementary power management programs for all building sectors.*

Building owners and consumers, including those in the public, commercial, and low-income sectors, need to be educated about energy management concepts and their benefits. For example, plug loads (appliances powered through standard electrical outlets) represent more than 20 percent of average home energy use,⁵⁸ while in the commercial sector, high energy use is often related to computers and other information technology equipment. Timing and method are also important, so education should target building owners when they are most likely to invest in efficiency upgrades and be provided in the form that will be of most assistance.

Key Initiatives

1. Work with building and real estate industry professionals, contractors, and others to educate building owners, property managers, and consumers about energy efficient upgrades at trigger points, such as changes in ownership, replacement of major equipment, or building remodeling or renovation, when an upgrade may be considered. Educate building owners and tenants about plug loads and the value of behavior changes.
2. Leverage ME&O efforts to reach all eligible building owners and tenants. Coordinate programs like Energy Upgrade California with low-income weatherization programs to reach the low-income sector.
3. In addition to conventional media strategies, use “peer-to-peer” methods to reach those who make decisions about efficiency upgrades. Decision makers may be more likely to act when their questions and concerns are addressed through success stories and peer recommendations.
4. Target messaging to emphasize the energy cost savings and increased property value benefits of both incremental efficiency improvements and whole-building upgrades.

58KEMA, 2009 California Residential Appliance Saturation Study, California Energy Commission, Sacramento, 2010, CEC- 200-2010-004-ES, p. 3, <<http://www.energy.ca.gov/2010publications/CEC-200-2010-004/CEC-200-2010-004-ES.PDF>>.

5. Develop and implement marketing strategies and outreach programs that target the highest priority buildings. Develop educational and programs that are relevant to tenants, owners of single family rental properties, and foreclosed or vacant properties.
6. Create a statewide outreach program to educate facility managers of industrial and retail buildings that emphasizes the financial, safety, property value, health, and comfort benefits of efficiency upgrades.
7. Promote statewide outreach to all public building managers by providing information about state goals, financing programs, and cost benefits.

Potential Stakeholders

Federal and state agencies; California's utilities; local and regional governments; Energy Upgrade California ME&O and Working Groups; energy advisors; education partners; Energy Upgrade California Home Upgrade Program implementers; contractors, raters, and building industries and associations; and Realtor associations, partners, and industry.

No Regrets Strategy 4: Foundational Workforce Resources

Overview

A highly skilled and well-trained workforce is essential to strengthening and growing California's green economy. As the energy efficiency market evolves, it will require new skills and knowledge to continue to meet market demand. In 2011, the CPUC commissioned a study which confirmed that judicious planning is required to build an adequately scaled workforce that is skilled in energy efficiency, distributed generation, and demand-side practices and technologies.⁵⁹ The study also informed the development and implementation of concurrent energy efficiency sector strategies – regional, industry-specific approaches to workforce needs – by the IOUs. Other complementary efforts on HVAC, lighting, and the smart grid support the recommendations outlined in the study.⁶⁰

VISION FOR WORKFORCE, EDUCATION & TRAINING

Create a highly skilled workforce that will properly and safely implement energy efficiency and demand-side practices and technologies in existing buildings to ensure optimal energy savings across California.

ARRA-funded pilot programs such as the Clean Energy Workforce Training Program (2009-2012) have increased the availability of clean energy skills training throughout California.⁶¹ With an investment of \$18.8 million of ARRA funds and collaboration at both the state and local levels, the program trained more than 8,000 unemployed and underemployed people for occupations related to energy and water efficiency and renewable energy.⁶² One of the most important lessons from this and other ARRA pilots is that collaboration among a wide range of training implementers and stakeholders is essential in developing sustainable and high-quality clean-energy training programs to meet market needs.

Achieving high levels of energy efficiency in existing buildings will also require close coordination among multiple government, business, labor, and community partners, as well as regional energy networks, to augment existing training efforts and implement new programs. California's size and diversity requires wider implementation of sector strategies to align

59 Carol Zabin, Karen Chapple, Ellen Avis, et al, *California Workforce Education & Training Needs Assessment: For Energy Efficiency, Distributed Generation, and Demand Response*, Donald Vial Center on Employment in the Green Economy, Berkeley, 2011, <http://www.irle.berkeley.edu/vial/publications/ca_workforce_needs_assessment.html>; Energy Efficiency Workforce Sector Strategy Portal, <<http://www.eesectorstrategy.com/>>, accessed May 2, 2013.

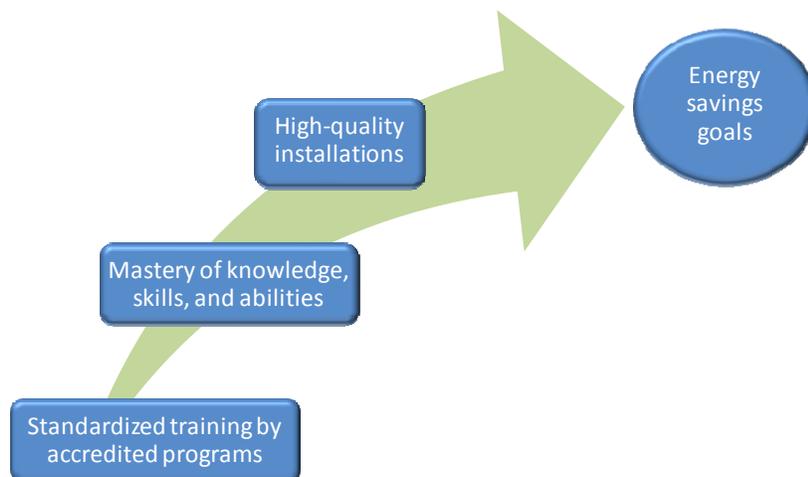
60 California Public Utilities Commission, *CA Energy Efficiency Strategic Plan. HVAC Action Plan: Heating Ventilation Air Conditioning 2010-2012*, CPUC, San Francisco, 2010, <<http://www.cpuc.ca.gov/NR/rdonlyres/25B56CBE-7B79-41BC-B1C0-AE147F423B19/0/HVACActionPlan.pdf>>, accessed May 2, 2013; California Public Utilities Commission, *CA Energy Efficiency Strategic Plan. Lighting Chapter*, CPUC, San Francisco, 2011, <http://www.cpuc.ca.gov/NR/rdonlyres/BE058656-3913-4DDD-92D5-60E82DD6AF0C/0/Lightingchapter_CAEnergyEfficiencyStrategicPlan_Jan2011.pdf>, accessed April 2, 2013; "Sacramento State Smart Grid Center," California Smart Grid Workforce Development Network, Sacramento, September 2010, <<https://greenjobs.workforce3one.org/view/2001029544358312839>>, accessed April 2, 2013.

61 "Clean Energy Jobs," California Energy Commission, Energy Archive, <<http://energyarchive.ca.gov/cleanenergyjobs/index.html>>, accessed May 2, 2013.

62 Other programs, such as the State Energy Sector Partnership and the Regional Clusters of Opportunity grants, also set complementary goals for collaborative strategic planning and implementation. See *California Green Jobs Council: Annual Report to the Legislature, 2010-2011*, California Workforce Investment Board, Sacramento, 2011.

workforce development with local industry requirements and economic development efforts.⁶³ Statewide training will give workers the skills needed to install energy efficiency measures that produce high energy savings (Figure 6).

Figure 6: Workforce Development Process



Source: California Energy Commission

Training should also be aligned with federal standards and market needs to ensure high quality, standardized, and relevant training. Examples of national standardization efforts include the U.S. DOE’s Guidelines for Home Energy Professionals, which creates standard work specifications, advanced professional certifications, and accredited training programs,⁶⁴ and an accreditation program created by the American National Standards Institute and the Interstate Renewable Energy Council for energy training programs to ensure standardization and quality.⁶⁵ Coordinated workforce development will require an evaluation of the various certification programs that are available and whether any are appropriate for and should be recognized by California.

A skilled workforce can promote market penetration of qualified clean energy practices and technologies through ongoing technical and hands-on training and education about

“As California continues to strengthen and improve its EE related codes, standards, and other EE requirements, there will be an increasing need to train, accredit, certify, expand and develop the EE industry workforce deployed throughout the state. Much of this workforce development will be centered upon the large number of contractors who collectively perform much of the EE retrofits and other work required by EE programs.”

William J. McNamara
Energy Management & Design

63 Doug Henton and John Melville, *Industry Clusters of Opportunity Users Guide*, California Regional Economies Project, Sacramento, 2008, <<http://www.sectorstrategies.org/sites/all/files/CREP%20Industries%20Guide.pdf>>, accessed May 3, 2013.

64 “Weatherization & Intergovernmental Program,” US Department of Energy Efficiency & Renewable Energy (EERE), <<http://www1.eere.energy.gov/wip/guidelines.html>>, accessed May 2, 2013; “Standard Work Specifications for Home Energy Upgrades,” National Renewable Energy Laboratory, <<https://sws.nrel.gov/>>, accessed April 4, 2013

65 *IREC Standard 14732: 2012: General Requirements for Renewable Energy and Energy Efficiency Certificate Programs (Draft)*, IREC, Latham, 2012, <<http://www.irecusa.org/wp-content/uploads/Draft-IREC-Standard-14732-2012-02-03.pdf>>, accessed May 2, 2013.

financing and rebate options. Training for building professionals must be current and add value. Partners will need to work together to identify and encourage hands-on learning, on-the-job training, and train the trainer opportunities and to learn from quality training models. Training efforts must also be sustainable,⁶⁶ and should be coordinated across sectors, for example, aligning training for the real estate industry (architects, engineers, real estate agents, appraisers, and others) with training for building professionals.

ARRA funding produced successful programs from which valuable lessons can be learned and replicated, including the California Advanced Lighting Controls Training Program, the RichmondBuild program, and the Desert Energy Enterprise Training Center.⁶⁷ To remain successful and relevant, however, these kinds of training programs need regular assessment to ensure that all energy-related professionals receive timely, consistent, and relevant training to bridge existing skill gaps.

Key Strategies

NR 4.1: *Streamline workforce development regionally and statewide to ensure that workforce, education, and training programs meet industry and market needs and the workforce has the necessary skills to perform quality installations, assessments, inspections, and related tasks for all building types.*

The energy efficiency marketplace will require workforce, education, and training programs to improve worker skills and provide continuing education for incumbent workers. Training needs to reinforce technical skills, address skill gaps, incorporate additional elements such as multifamily housing, and be flexible enough to keep abreast of technological advances and changes to codes and standards. For quality assurance, instruction and training should be standardized and lead to certification. This may include encouraging the expansion of existing certifications to incorporate multifamily housing components. Also, career paths that respond to industry needs should be established and include “stackable” credentials to provide career advancement opportunities.

Key Initiatives

1. Create career paths and stackable credentials in career technical education programs, community colleges, and other training programs that enable workers at all levels to provide competent services and to have the potential for career advancement.
2. Expand continuing education training for contractors from accredited training providers. Evaluate a long-term strategy to require periodic testing for such skills under California State License Board requirements.

66 See Brook, et al, *Achieving Energy Savings in California Buildings*; Energy Market Innovations, *California HVAC Contractor & Technician Behavior Study: Final Report*, Energy Market Innovations, Inc., Seattle, September 14, 2012, <http://calmac.org/publications/CA_HVAC_Behavior_Study_FinalReport_2012Sept14_FINAL.pdf>, accessed May 3, 2013.

67 California Advanced Lighting Controls Program, <<https://www.calctp.org/>>, accessed April 3, 2013; RichmondBUILD Academy, City of Richmond, <<http://www.ci.richmond.ca.us/index.aspx?nid=1243>>, accessed May 2, 2013; “Energy Efficiency,” College of the Desert, <<http://www.collegeofthedesert.edu/community/ewd/Pages/ee.aspx>>, accessed May 2, 2013.

3. Provide training for nontechnical skills such as marketing and business management training, along with training on available financing products, to contractors and related professionals.
4. Provide standardized continuing education and regional sector strategy initiatives that are coordinated with local economic development activities to foster market penetration of proven energy efficiency, distributed generation, and demand-side management practices and technologies.
5. Promote and assist value-added, hands-on learning opportunities overseen by qualified field trainers, sponsored by industry representatives, and offered through on-the-job training, internships, and mentorships for a wide array of contractors.
6. Promote training on individual measures for HVAC, building envelope, lighting, zero net energy, plug load, distributed generation, demand response, water heating, controls, smart meters, and other energy efficiency measures along with whole-building performance training that integrates all of these measures.
7. Incorporate program evaluation, measurement and verification; data collection for job placement; verification of skills achievement; and quality assurance for training delivery. Make information available for contractor feedback.

NR 4.2: *Create strong partnerships with energy, labor, and education entities to coordinate and augment existing workforce efforts.*

Building cross-sector partnerships is essential to coordinating existing workforce efforts. Cross-sector partnerships will ensure that training is relevant and aligned with building standards and job specifications. Partnerships may include businesses, economic development and workforce development agencies, labor, community-based organizations, utilities, regional energy networks, education providers (such as K-12 and adult education), and other market actors.

“Dysfunctional labor markets and skills mismatches have proven to be barriers to the expansion of the markets for new clean technology. California has the capacity to overcome these [barriers], but it requires a concerted effort between the state’s energy and workforce entities to engage strategically around workforce development planning.”

Diane Ravnik
Division of Apprenticeship Standards

Key Initiatives

1. Align training and job creation with industry needs based on real-time data-driven sector-specific strategies developed in partnership with regional workforce and economic development efforts and other market actors.
2. Establish career opportunities for entry level, disadvantaged, and hard-to-reach populations. Target contractors in disadvantaged communities for training. Work with local workforce investment boards and community-based organizations to identify candidates and ensure mastery of relevant tools and knowledge.

3. Train inspectors, assessors, and real estate professionals to use tools to include energy efficiency, distributed generation, energy upgrades (including rebates and financing offerings), building and energy code compliance, and the added property value of upgrade projects.
4. Ensure training aligns and complies with Contractor State Licensing Board regulations, building energy efficiency standards, and statewide initiatives and also considers climate zone requirements and quality and safety standards. Provide ongoing training for contractors, architects, building officials, and others in permitting and enforcement.

Potential Stakeholders

Federal and state agencies; California's utilities; regional energy networks; local and regional governments; local workforce, economic development, and education agencies; labor; real estate industry professionals; and community-based organizations.

CHAPTER 3: VOLUNTARY PATHWAYS

Voluntary Pathway 1: Create Multiple Pathways for Residential Property Owners

Overview

The results of the ARRA pilot programs showed that there are many issues to be addressed before California can meet its energy efficiency goals. A primary issue is the need for a broader choice of pathways toward increased efficiency for single family and multifamily building owners with an emphasis on simplifying program designs to the extent possible.

VISION FOR MULTIPLE PATHWAYS

Maximize energy savings by encouraging multiple pathways to energy efficiency upgrades in building projects.

California has more than 13 million single family and multifamily housing units.⁶⁸ ARRA funding provided the opportunity to pilot residential programs for AB 758 that yielded valuable information for designing future residential energy efficiency programs to help unlock the large potential for energy savings in these buildings. In 2010, the Energy Upgrade California Whole House Upgrade Program represented the largest ARRA investment and promoted the “whole-house” or “building-as-a-system” approach to energy efficiency upgrades. The Energy Commission invested about a third of its ARRA funds in innovative upgrade and finance programs for single family and multifamily projects, and created tools and protocols needed to scale up energy efficiency upgrades.

Over three years, single family whole-house upgrades transitioned from a seldom-used approach to deployment in more than 6,000 projects. In addition, about 2,500 multifamily upgrade projects were completed and more than 3,700 targeted commercial measures were installed. The success of these programs was largely the result of innovative financing and rebates that gave building owners the means to take decisive action.

Although the ARRA pilots began the transformation of the energy efficiency market, they also highlighted gaps and imbalances. One issue is that not all building owners are interested in or capable of completing whole-building upgrades in a single project. During the ARRA funding period, at least 1 million homes underwent some type of general renovation or improvement.⁶⁹ Each of these

“[It] is necessary to have a wider approach...Not everyone, not even most building owners, can afford or are sufficiently motivated, to spend the amount of money necessary to produce the deepest energy [upgrades].”

John Proctor
Proctor Engineering

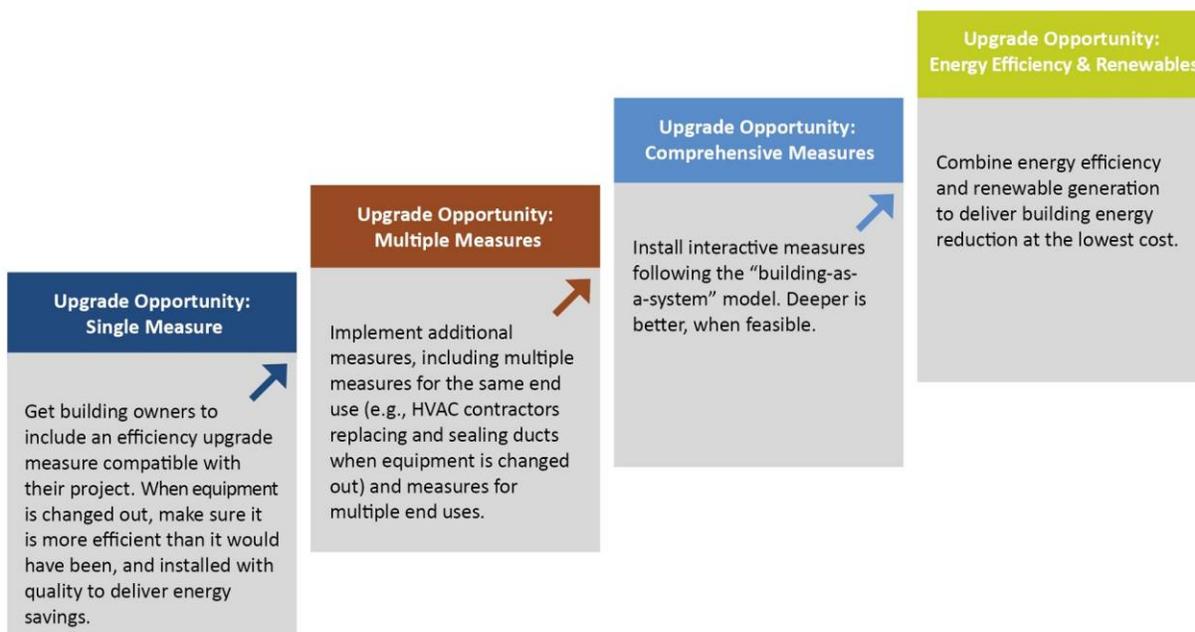
68 “2010 Census Interactive Population Search,” US Census 2010, <<http://www.census.gov/2010census/popmap/ipmtext.php?fl=06>>, accessed May 1, 2013.

69 This conservative figure is based on an estimate of 800,000 single family central air conditioner/furnace unit replacements during the ARRA period. See Michael Messenger, *Strategic Plan to Reduce the Energy Impact of Air Conditioners*, California Energy Commission, Sacramento, June 2008, CEC-400-2008-010; Richard Pulliam, *California Residential Energy Efficiency Market Share Tracking: HVAC 2005*, Southern California Edison, Rosemead, 2006; U.S. Department of Energy, 2011-06-06

projects represented a “touch point” for providing information on energy efficiency and the possibility of influencing the project scope to capture available efficiency opportunities. Events at various times during a building’s useful life, such as routine maintenance, remodeling, or major renovations, provide valuable opportunities to add efficiency measures to reduce energy use. Providing multiple pathways to these measures will allow building owners and other decision makers to choose between single measures, multiple measures, comprehensive measures, or renewable self-generation projects (Figure 7). To achieve the maximum energy savings, all pathways will need to comply with the building efficiency standards and provide an “on ramp” for the building owner to consider additional or future improvements to the building. Pathways also need to provide a plan for building owners to pursue deeper upgrades over time and encourage sensible and cost-effective early changeout of appliances and equipment.

“Using a simplified, more accurate and less costly rebate process that is tied to actual energy bills, contractors would likely be incented to guarantee savings and rebate amounts within an acceptable range because they would very quickly learn what combination of measures is most effective in actual energy reduction.”
 Devon Hartman
 CBPCA and Efficiency First California

Figure 7: Residential Energy Upgrade Pathways



Source: PECl

Lessons learned from the ARRA pilots led to the evolution of Energy Upgrade California from single family and multifamily whole-building upgrade programs to an umbrella brand for all

Technical Support Document: Energy Efficiency Program for Consumer Products: Residential Central Air Conditioners, Heat Pumps, and Furnaces, U.S. Department of Energy, Washington, D.C., 2011.

residential and small commercial programs.^{70, 71} Program offerings can now include multiple pathways for building owners and tenants to participate in energy efficiency and integrated demand-side management projects. The Energy Upgrade California Home Upgrade program will continue as a separate program through the IOUs, regional energy networks (RENs), and local governments. The Energy Upgrade California Multifamily program will also continue with pilots offered by the IOUs and RENs, in collaboration with the Multifamily Home Energy Retrofit Coordinating Committee. This program is being leveraged with the Energy Savings Assistance Program, Moderate Income Direct Install, and the Multifamily Energy Efficiency Program.

Since the Energy Upgrade California Home Upgrade program now embraces multiple pathways, contractors and other market actors who engage in single measures will need to be actively recruited and convinced to expand their services to include energy efficiency measures and ensure full compliance with codes and standards. Contractors have a unique opportunity to educate building owners, managers, and other decision makers about opportunities for energy savings and persuade them to take action. For example, energy savings result not only from energy efficiency improvements, but also from changes in behavior.⁷² Contractors can increase consumer awareness of simple measures to save energy, such as using power strips, purchasing computers and televisions with energy-saving features, and early replacement of appliances with more efficient versions.

Key Strategy

VP 1.1: *Create easy access to different energy efficiency pathways for every building owner and tenant.*

The Energy Commission, the CPUC, regional and local governments, and program administrators will work together to harmonize upgrade program offerings, requirements for quality assurance, and ongoing performance evaluation. This process will engage performance contractors and other stakeholders to increase performance, assure quality projects, and ensure customer satisfaction.

Key Initiatives

1. Use ARRA and IOU Whole House Upgrade Program EM&V outcomes to guide program changes, expansion, and enhancements, and to persuade building owners to make energy efficiency improvements.

70 California Public Utilities Commission, *Decision Providing Guidance on 2013-2014 Energy Efficiency Portfolios and 2012 Marketing, Education, and Outreach*, D. 12-05-015, May 18, 2012, <http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/166830.PDF>, accessed May 24, 2013. Energy Upgrade California, <<https://energyupgradeca.org/overview>>, April 2, 2013.

71 As part of Energy Upgrade California's rebranding, the Energy Upgrade California Whole House Upgrade Program has now been renamed Energy Upgrade California Home Upgrade Program.

72 KEMA, *2009 California Residential Appliance Saturation Study*, California Energy Commission, Sacramento, 2010, CEC- 200-2010-004-ES, p. 3, <<http://www.energy.ca.gov/2010publications/CEC-200-2010-004/CEC-200-2010-004-ES.PDF>>.

2. Expand energy efficiency upgrade opportunities for those making building upgrade decisions when the decision maker is in the best position to make an energy upgrade in whole or incrementally.
3. Adapt programs to allow for multiple ways to participate in efficiency programs, including single measures, multiple measures, deep upgrades, or self-generation projects.
4. Educate contractors on all energy efficiency program offerings, including integrated demand-side-management-related activities and financing opportunities.
5. Continue to revise the Energy Upgrade California Home Upgrade program and Multifamily pilots to enhance program offerings, remove barriers to building owner and tenant participation, and improve quality assurance, contractor performance, and customer satisfaction.
6. Conduct effective and minimally invasive quality assurance to provide confidence that quality improvements are installed, requirements are fulfilled, and consumer satisfaction is achieved.
7. Conduct ongoing program assessments, including collection of project data, compare predicted versus achieved savings, and report performance metrics and outcomes regularly.

Potential Stakeholders

Federal and state agencies; California’s utilities; local and regional governments; utility and local third-party program implementers; Energy Upgrade California Working Group; Multifamily Home Energy Retrofit Coordinating Committee; Statewide Energy Upgrade California ME&O; building industry professionals; building officials; real estate industry professionals; industry associations; workforce, education and training partners; financing entities; and property owners.

Voluntary Pathway 2: Standardize Tools for Benchmarking, Auditing, and Retrocommissioning of Nonresidential Buildings

Overview

The first step to achieving cost-effective energy savings in the majority of existing buildings is identifying which buildings can provide those savings using benchmarking, auditing, and retrocommissioning tools that meet the needs of most nonresidential buildings.⁷³ Savings associated with these tools can be significant: a recent analysis of more than 35,000 nonresidential buildings that consistently benchmarked their energy use showed an average annual energy reduction of 2.4 percent.⁷⁴ However, most upgrade programs and tools focus on the largest nonresidential buildings and do not serve the needs of most existing buildings. The energy efficiency market needs an integrated and standardized set of tools that can be scaled and customized for underserved portions of the nonresidential sector.

VISION FOR COMMERCIAL AND PUBLIC BUILDINGS

Provide accurate and reliable information, and readily available technical support to identify appropriate energy efficiency opportunities that encourages confident investment in energy efficiency improvements, which results in expected levels of energy savings and nonenergy benefits.

Generally, building benchmarking is the first step to determining whether further actions such as energy audits or retrocommissioning are appropriate. The United States Environmental Protection Agency's (U.S. EPA) ENERGY STAR[®] Portfolio Manager is the industry standard for commercial building energy benchmarking.⁷⁵ This tool works well for buildings with similar characteristics that are easily compared (such as large commercial buildings). However, energy use in California is different than in the greater United States, and some buildings cannot be rated due to their size and energy usage. This limits the Portfolio Manager's usefulness and illustrates the need to develop or adapt benchmarking tools for California buildings.

⁷³ *Benchmarking* is comparing the performance metrics of a building to those of similar buildings in the same area. *Auditing* refers to a broad spectrum of energy studies ranging from a quick walk-through to a comprehensive analysis, with recommendations for efficiency improvements. *Retrocommissioning* is the process of ensuring that existing buildings and their systems are designed, installed, functionally tested, and capable of being operated and maintained according to the owner's operational needs.

⁷⁴ "Benchmarking and Energy Savings," Energy Star Portfolio Manager Data Trends, October 2012, <http://www.energystar.gov/ia/business/downloads/datatrends/DataTrends_Savings_20121002.pdf>, accessed May 15, 2013.

⁷⁵ ENERGY STAR[®] Performance Ratings Technical Methodology, U.S. EPA, March 2011, <http://www.energystar.gov/ia/business/evaluate_performance/General_Overview_tech_methodology.pdf?3833-4f06>, accessed May 7, 2013; Satkartar Kinney and Mary Ann Piette, "Development of a California Commercial Building Energy Benchmarking Database," paper presented at the ACEEE Summer Study, Pacific Grove, August 18-23, 2002, pp. 11-12; Martha Brook, "Rating the Energy Performance of CA Commercial Buildings," presentation at Energy Commission Committee Workshop, Sacramento, August 13, 2009, <http://www.energy.ca.gov/ab1103/documents/2009-08-13_workshop/presentations/Martha_Brook_Presentation.pdf>, accessed May 7, 2013.

If the benchmarking process indicates that it is appropriate, the next step is an energy audit. Energy audits estimate the costs and project energy savings from energy efficiency improvements, including capital improvements such as equipment upgrades, as well as operational measures like changing equipment schedules. American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE) audits have been extensively used as the baseline for what constitutes an “investment-grade” evaluation of the potential benefits of improving energy performance. These audits have different levels, each with different standards for rigor and scope.⁷⁶

“When it comes to utility energy efficiency programs... [small to midsize building are often] lost in the shuffle...Most importantly, [strategies] must be able to target the buildings with the greatest potential and engage them with compelling operational and retrofit opportunities to get them interested in efficiency. And they must do it at scale.”

Mike Kaplan
Retroficiency

The final step for evaluating existing nonresidential buildings is usually retrocommissioning. In large buildings, retrocommissioning results in recommendations to maintain occupant comfort by using building management systems (BMS) that make the best use of equipment to deliver energy savings, peak load reduction, or integrated demand-side management. Although smaller buildings often cannot justify the expense of a BMS, smart controllers for HVAC and lighting are increasingly able to deliver energy savings and demand reduction comparable to those enabled by BMS. Current incentive programs generally limit participation in retrocommissioning programs to buildings 50,000 square feet and larger, leaving more than half of the buildings in California ineligible.⁷⁷

An alternative to a full retrocommissioning is Building Optimization Analysis (BOA), a simplified tool to quickly calculate the potential for energy savings.⁷⁸ This tool is based on analysis of savings from common upgrades in five building types. Again, however, the average building size evaluated when creating this tool was roughly 500,000 square feet, making it difficult to apply the tool to smaller buildings.

Key Strategies

VP 2.1: *Develop benchmarking approaches that enable targeting of high-opportunity buildings for audits, retrocommissioning, and other upgrades.*

It is essential that tools developed for benchmarking serve buildings with the most potential for energy efficiency improvements and savings. Specific, accurate, and actionable data for

⁷⁶ Michael Deru, Jim Kelsey, and Dick Pearson, *Procedures for Commercial Building Energy Audits*, 2nd ed., American Society for Heating, Refrigerating and Air-Conditioning Engineers, Inc., Atlanta, 2011.

⁷⁷ “2013 Retrocommissioning Program Application,” Pacific Gas and Electric, <http://www.pge.com/includes/docs/pdfs/mybusiness/energysavingsrebates/analyzer/retrocommissioning/RCx_program_application.pdf>, accessed May 15, 2013.

⁷⁸ Dave Moser, Michelle Lichtenfels, and Eric Greensfelder, *Building Optimization Analysis (BOA) Tool Final Project Report to PG&E, PEI*, San Francisco, September 30, 2010, <http://www.calmac.org/publications/BOA_Tool_Final_Report.pdf>, accessed May 15, 2013.

individual buildings is needed to inform the decisions of building owners, tenants, and the broader commercial real estate market actors. Developing approaches to benchmarking that enable the targeting of high-opportunity buildings will allow building owners to prioritize their upgrade projects and focus finite resources in areas that will yield the greatest energy and cost savings.

Key Initiatives

1. Develop benchmarking tool(s) that are appropriate for the various segments of the commercial and public building markets (for example, large offices, small offices, restaurants, and retail).
2. Identify the segments of the commercial and public building markets with the highest opportunity for cost-effective, energy efficient improvements and ensure that tools are adapted for these segments.
3. Design and implement a plan for widespread delivery of tools that considers the special business needs and communication channels within each high-opportunity market segment and identifies auditing and retrocommissioning improvement opportunities.

VP 2.2: *Promote standard tools and quality assurance for application of those tools to increase user confidence.*

The nonresidential marketplace must use standardized tools that offer reliable energy use data and estimates for energy savings from proposed measures. Building owners and other decision makers need assurance that their investments in energy efficiency will be rewarded with energy cost savings. This assurance can be delivered by establishing objective standards for the tools that calculate energy savings, including equipment and installation costs, and estimates of efficiency measure savings. These standards should be developed in cooperation with existing federal, state, and utility efforts. Tools should also be based on or calibrated to actuarial performance data from comparable projects within each unique market segment by leveraging EM&V efforts from existing efficiency programs. Information must also be relevant, easily accessible, and include factors that building owners and operators consider when making investment decisions.

Key Initiatives

1. Identify, develop, or modify energy benchmarking, auditing, and retrocommissioning methods that are suitable and scalable for a wide range of segments. Methods should include both energy and nonenergy benefits in situations when nonenergy benefits can be quantified and monetized.
2. Identify, develop, or modify savings calculation methods that provide consistent and reliable energy, demand, and cost-saving estimates, using actuarial data to the extent possible to test the accuracy of calculation methods.

3. Establish an actuarial basis for validating the costs and savings used for energy measure incentive program calculations, and ensure that tools used are consistent across utility and municipality jurisdictions.
4. Identify critical decision-making factors for high-opportunity sectors to implement benchmarking, audits, retrocommissioning, and energy efficiency upgrades. Use existing or develop new tools that address those factors while encouraging upgrades that support zero net energy goals.
5. Pilot tools through regional energy networks and local governments to determine the most effective platforms and approaches to reach utility customers in targeted building sectors.

Potential Stakeholders

Federal and state agencies; California utilities; local and regional governments; building industry professionals; software developers; industry associations and collaboratives; research and educational organizations; nonprofit organizations; and building owners and associations.

Voluntary Pathway 3: Upgrades for Small and Medium Commercial Buildings

Overview

The success of AB 758 depends in part on whether program design implementers and partners can deliver various program pathways to energy efficiency upgrades for different building types and sizes. Small and medium size commercial buildings comprise the majority of commercial buildings, but have been underserved by traditional incentive programs and received far less financial and social encouragement to adopt energy efficiency principles than larger commercial buildings.

VISION FOR UPGRADES FOR SMALL AND MEDIUM COMMERCIAL BUILDINGS

Ensure that business owners understand the economic benefits of energy efficiency and have effective and accessible resources to take action.

Small and medium commercial buildings are hard-to-reach with efficiency improvements for several reasons. First, units within the buildings are often rented or leased to small businesses. Second, there is generally no single point of contact responsible for managing energy use. Third, tenants tend to be small businesses with triple net leases – agreements under which tenants pay building expenses such as taxes, insurance, maintenance, repairs, and utilities in addition to rent – which removes a building owner’s financial incentive to be concerned about monthly energy bills. Fourth, contractors servicing these buildings tend to be small businesses and may not have expertise in energy efficiency or building science. These factors, along with the large diversity of businesses within these buildings, make it difficult to design and implement incentive programs suitable for broad adoption by all segments within this market sector.⁷⁹

Cost-effective approaches must be developed and specifically targeted to building groups and business types whose needs are uniform enough to be served under a specific incentive program. Occupant needs must be well-understood and incorporated in communication strategies that accommodate the ethnic and social diversity of small business owners.⁸⁰

“Once you get to small and medium buildings, it won’t be a one size fits all program.”

Dave Moser
PECI

Market segmentation research is required to fully assess the building stock, the needs and priorities of businesses within those buildings, and the best ways to communicate with decision makers at those businesses.⁸¹

⁷⁹ Itron, *California Commercial End-Use Survey*, California Energy Commission, Sacramento, March 2006, CEC-400-2006-005, <<http://www.energy.ca.gov/2006publications/CEC-400-2006-005/CEC-400-2006-005.PDF>>, accessed April 27, 2013.

⁸⁰ *Oakland Shines ARRA-SEP Commercial Retrofit Program Final Report*, Quantum Energy Services and Technologies, April 16, 2012, <http://www.energy.ca.gov/ab758/documents/ARRA-Programs/final_reports/Downtown_Oakland_Tgtd_Measure_Sat_Project-Quantum-Final_Report_2012-04-16.pdf>, accessed March 14, 2013.

⁸¹ Stephen Moss, *Market Segmentation and Energy Efficiency Program Design*, California Institute for Energy and Environment, Oakland, November 2008, <http://www1.eere.energy.gov/buildings/betterbuildings/neighborhoods/pdfs/market_seg.pdf>, accessed April 27, 2013.

ARRA pilot programs showed that presenting viable upgrade options did not necessarily require deep technical discussions.⁸² Approaches that were as important to program success included making sure interactions were positive, minimizing the amount of time and attention needed from customers to move to the next step in the upgrade process, and supplying energy performance improvements that provided immediate value to the customer.

New program development must include the lessons learned from successful programs and consider the business needs of building owners, tenants, and property managers. Approaches must be sufficiently segmented for this building sector and provide the right level of analysis for a typical building used in a specific market. New program pilots will also need to focus on in-person and market-specific approaches to ensure that those making energy efficiency upgrade decisions fully understand the direct benefits of those upgrades.

Figure 8: Small and Medium Commercial Buildings



Source: PEI

82 *Oakland Shines ARRA-SEP Commercial Retrofit Program Final Report*, Quantum Energy Services and Technologies, April 16, 2012, <http://www.energy.ca.gov/ab758/documents/ARRA-Programs/final_reports/Downtown_Oakland_Tgtd_Measure_Sat_Project-Quantum-Final_Report_2012-04-16.pdf>, accessed March 14, 2013.

Developing a skilled workforce to audit and evaluate small and medium commercial buildings will be the first step in implementing this pathway, using lessons learned from successful ARRA pilot programs such as the EnergySmart Jobs program.⁸³ Through this program, the California Conservation Corps was trained to conduct initial equipment surveys and to install simple efficiency measures. This was followed by installation of more extensive energy upgrades by participating contractors. The trust established during the initial interaction for the simpler measures created a pathway for promoting deeper and more technical energy upgrades. Similar programs could easily be replicated statewide to target specific energy savings or create a pathway to deeper energy upgrades.

Key Strategies

VP 3.1: *Survey workforce development programs, utilities, local governments, and regional energy networks to establish baseline energy use and performance levels for small and medium commercial buildings.*

Partnerships with workforce development programs, utilities, local governments, and regional energy networks will promote trust and improve collaboration among programs and offerings. Access to customer energy use data will also be important to the success of this strategy. Rigorous analysis of these communications and energy use data sets will allow the design of market-specific and streamlined audit procedures.

Key Initiatives

1. Leverage benchmarking to target small and medium commercial buildings most likely to benefit from a preliminary audit to determine efficiency potential and identify buildings that will be best served by a more detailed audit.
2. Determine the energy use features and equipment that can be deployed in “direct install” programs for different market segments at the time of initial customer engagement.
3. Use in-person visits to obtain access to energy use data (through customer release) and building characteristics for nonintrusive assessments in the future.
4. Identify and communicate financing and rebate opportunities available to building owners as part of customer engagement.

VP 3.2: *Develop a cost-effective energy audit protocol for small and medium commercial buildings.*

Small and medium commercial buildings present auditing challenges not found in other buildings. These challenges include more diverse service equipment, building uses, and building types along with lease or ownership structures not found in residential, large commercial, or

⁸³ “EnergySmart Jobs,” California Conservation Corps, < <http://www.ccc.ca.gov/work/programs/esj/Pages/esj.aspx>>, accessed March 14, 2013.

public buildings. The capital outlay and facility management support found in large commercial and public buildings are generally out of reach to the small and medium commercial building owner. Meeting these challenges will require an approach to building performance auditing that is less costly than the standard ASHRAE processes but still sophisticated enough to yield useful information and action.

Despite the diversity among these buildings, there are often common areas where energy conservation can be improved. Audit methods and upgrade opportunities can be grouped based on common elements in construction and equipment installation by building vintage, size, and type. Audit and upgrade strategies can leverage similar characteristics to take advantage of economies of scale, and provide a cost-effective return on investment to building owners. Collection of energy performance data will support audit protocols that rely on energy use profiles and business needs of specific segments. Accessible and accurate results from audits will provide owners and tenants with the information they need to create an energy upgrade plan and take action.

Key Initiatives

1. Leverage existing audit protocols from California utility incentive programs and those being developed by other organizations, using smart meter data as appropriate.
2. Establish audit protocols that are cost-effective for small and medium buildings, including envelope improvements, equipment upgrades, equipment repairs and tuning, and system control improvements in the scope of the audit protocols to create a plan toward deeper energy upgrades.
3. Identify key opportunities or “trigger points” – such as financial transactions that result in change of ownership, occupancy, or financing; replacement of major equipment; or building remodeling or renovation – to conduct audits and upgrades.

VP 3.3: *Conduct various energy efficiency upgrade pilots in small and medium commercial buildings to better understand energy-saving potential, the level of specific support needed by building owners and tenants, and the level and quality of work conducted by specialty trade contractors.*

Pilot programs can assess the most effective ways to demystify energy efficiency for building owners and tenants while also helping policy makers to understand the factors that are important to achieve support from the marketplace. A variety of targeted upgrade pilot projects is needed to determine the best way to reach unique segments of this broad and diverse sector. Piloting “bundled measures” – for example, replacing lighting controls at the same time light fixtures are replaced, or ductwork during an HVAC tune-up or upgrade – would provide a first step to deeper or whole-building upgrade programs leading to achievement of zero net energy objectives. Bundled measures would include a pathway to finance upgrades in a way that minimizes financial and other impacts and allows capital-constrained market segments to be reached by upgrade programs. Market participants and those who make building energy decisions within this sector are diverse, so it is essential to create approaches

that effectively reach, learn from, and teach these market segments. Successful implementation of pilot programs is critical to gain acceptance from market actors and policy makers.

Key Initiatives

1. Pilot the audit protocols developed in key initiative VP3.2.
2. Partner with existing stakeholders to design and support a statewide upgrade program focusing on repairs to existing economizers (devices on air-conditioning units that can provide significant energy savings) in small and medium commercial buildings.
3. Assess opportunities to extend and enhance solutions for retrocommissioning small and medium commercial buildings that are being explored within the 2013-2014 statewide IOU Commercial Advisor Energy program.
4. Assess opportunities to extend and enhance the utilities' HVAC quality maintenance and quality installation programs.
5. Pilot bundled measure upgrade programs as first step to deeper or whole-building upgrades, building on work currently underway in the Calculated Incentives Program.
6. Use lessons learned and best practices from municipal building job order contracting to standardize upgrade costs, financing, project management, and engineering services.
7. Conduct pilots that provide information to decision makers and test delivery mechanisms.
8. Identify opportunities to extend, enhance and leverage utility marketing and outreach budgets and activities for small and medium commercial buildings.
9. Identify key opportunities or "trigger points" in the life of small and medium commercial buildings – such as financial transactions that result in change of ownership, occupancy, or financing; replacement of major equipment; or building remodeling or renovation – to make efficiency upgrades, and pilot programs (including demand-side management) that can take advantage of these key opportunities.

VP 3.4: *Promote voluntary certifications for trade contractors who specialize in small and medium commercial buildings to improve quality installations and increase consumer confidence.*

Delivery of advertised and promised energy savings can be uncertain, posing a barrier to willingness to install energy efficiency upgrades. Several organizations provide certifications for specialty trade contractors; for example, the Building Performance Institute provides certification for residential building service providers, and North American Technician Excellence provides certification for residential and commercial HVAC service providers. However, if the value and meaning of these certifications are not clear, customers will likely select contractors based on project costs alone. Awareness of and knowledge about certifications will better inform those making energy efficiency upgrade decisions. Improved

awareness will also make customers more confident that they will receive quality upgrade installations, which will promote a broad contractor market that recognizes distinctions between levels of professional certifications.

Key Initiatives

1. Identify existing or new certifications specific to classes of energy efficiency and integrated demand-side management measures such as lighting controls, HVAC tune-ups, HVAC equipment replacements, and energy management control systems installations.
2. Support utility programs that incentivize, require, and promote the use of contractors with appropriate certifications.

Potential Stakeholders

Federal and state agencies; California's utilities; local and regional governments; building industry professionals; workforce development partners; labor organizations; nonprofit and business organizations; and building owners and tenant associations.

Voluntary Pathway 4: Public Sector Leadership

Overview

California leads the nation in its efforts to address climate change and promote energy efficiency in existing buildings. In addition to AB 758, California has enacted various laws specifically addressing buildings owned and operated by public entities. When possible, public buildings are required to reduce energy consumption, increase energy efficiency, produce onsite electrical distributed generation, and reduce the level of peak electricity consumption using alternative energy equipment, thermal energy storage technologies, or cogeneration equipment.⁸⁴

VISION FOR PUBLIC SECTOR LEADERSHIP

Public buildings are in a prime position to demonstrate leadership while taking bold, decisive steps along the path of energy efficiency.

California's energy policy is constantly evolving. Governor Brown's Executive Order B-18-12 and the accompanying *Green Building Action Plan* are continuing the push for increased energy savings in public buildings by:⁸⁵

- Setting a goal to reduce grid-based energy purchases by 20 percent below the 2003 baseline by 2018 (Figure 9).
- Requiring new state buildings and major renovations started after 2025 to be zero net energy and 50 percent of existing square footage to be in the process of achieving zero net energy by 2025.
- Requiring new buildings or major renovations larger than 10,000 square feet to earn the "silver" Leadership in Energy and Environmental Design (LEED) certification and incorporate on-site renewable energy, if economically feasible.

Local governments are also building innovative facilities using cutting-edge technologies and are constantly seeking pathways and resources to optimize their operations. For example, the Southern California Regional Energy Network (SoCal REN) approved by the CPUC proposes to improve the energy efficiency of municipal buildings within the Southern California Edison service territory; San Francisco has implemented a

"A key tool for bringing local government programs to scale in 2013-2014 will be the formation of local government Regional Energy Networks, which will complement the ongoing work of local governments and IOU programs."

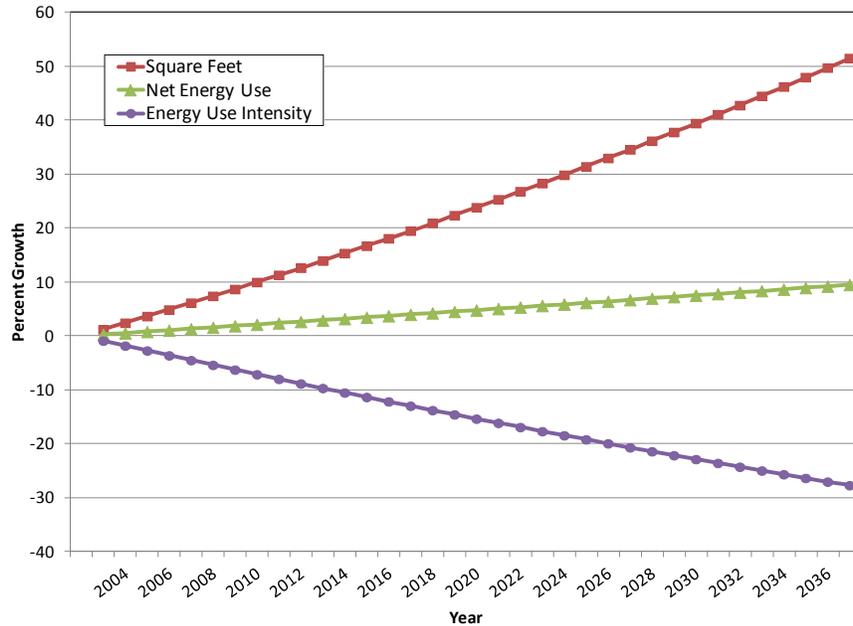
*Jody London
Local Government Sustainable
Energy Coalition*

84 See AB 532 Solar Energy on State Buildings (Wolk, Chapter 598, Statutes of 2007); AB 549 Reducing Energy Consumption in Existing Buildings (Longville, Chapter 905, Statutes of 2001); AB 811 Contractual Assessments: Energy Efficiency Improvements (Levine, Chapter 159, Statutes of 2008); and AB 1103 Commercial Building Energy Use Disclosure Program (Saldaña, Chapter 533, Statutes of 2007).

85 "Executive Order B-18-12," Office of Governor Edmund G. Brown Jr., <<http://gov.ca.gov/news.php?id=17508>> accessed April 30, 2013; Green Building Action Plan – For Implementation of Executive Order B-18-12, <http://www.climatechange.ca.gov/climate_action_team/documents/Green_Building_Action_Plan.pdf>, accessed April 30, 2013.

forward-thinking benchmark, disclosure, and audit law; and Berkeley has had residential and commercial upgrade ordinances in place for many years.

Figure 9: Growth in State-Owned Building Area, Energy Use Intensity, and Total Energy Use



Source: California Energy Commission⁸⁶

Programs to improve energy efficiency in public schools include the Energy Commission’s Bright Schools Program, which has helped hundreds of K-12 school districts improve the energy efficiency of new and existing schools. Between 2000 and 2010, the program identified an estimated \$4.8 million in annual energy cost savings. In addition, the Energy Commission’s Energy Conservation Assistance Act Program provides low-interest financing for energy efficiency and renewable projects, and has provided more than \$50 million in revolving loans for energy efficiency improvements in K-12 schools since 1988.

In addition to reducing energy costs, increased efficiency in public buildings provides the opportunity for government leadership in demonstrating the value of these improvements to help increase their wider deployment. Promoting greater efficiency in public buildings will establish a record of proven benefits and the most effective ways to implement, measure, and finance efficiency upgrades in existing buildings, while also saving taxpayer dollars.

As public buildings begin adopting energy efficiency measures, they will require support from both the public and private sectors. Collection of accurate and reliable energy performance data for public buildings will be critical to enable stakeholders to make informed decisions on

⁸⁶ Data from this graph can be found at “2003-2010 State-Owned Buildings Energy Use and Benchmarking,” Department of General Services, <<http://www.documents.dgs.ca.gov/Green/buildingsenergyuse.pdf>>, accessed May 15, 2013.

the appropriate action to take for their own buildings.⁸⁷ Documenting energy upgrade efforts and the decision making process is also important with decisions likely to be based on cost-effectiveness, available financing, energy use relative to current building standard requirements, transmission and distribution congestion, and energy use compared to similar buildings.

Figure 10: Public Buildings



Source: PECl

Energy performance data is needed to compare a building's energy use to similar buildings in the same climate region (for example, comparing a fire station in Sacramento to one in Stockton). Such data will also enable tracking improvements over time; in Minnesota, for example, the web-based B3 Benchmarking Program has successfully benchmarked almost 300 million square feet of public building floor area.⁸⁸

Job order contracting (JOC), a successful method to propel energy efficiency in public buildings that was piloted under an ARRA contract by the San Francisco Public Utilities Commission, has had success in reducing costs, improving materials quality, reducing construction time, and replicating costs for other projects.^{89, 90} Cost savings are generally attributed to shorter

⁸⁷ For a more detailed discussion of data issues, see No Regrets Strategy 1.

⁸⁸ "State of Minnesota B3 Benchmarking," Minnesota Department of Administration, <<https://mn.b3benchmarking.com/Default.aspx>>, accessed March 14, 1013.

⁸⁹ "A Job Order Contract is an indefinite quantity contract pursuant to which the San Francisco Public Utilities Commission may accomplish a series of projects with a single, competitively bid contract awarded before the projects are identified. Contractors bid an adjustment factor to pre-set unit prices. Work is accomplished by issuing task orders to the successful contractor during

schedules and reduced contracting costs. A similar process could be initiated by other public entities, utilities, regional energy networks, and local governments, and eventually be expanded to contracting processes for small nonresidential buildings.

Finally, local governments can encourage improvements in privately owned buildings by implementing *green lease* principles for their internal leasing needs.⁹¹ This could then be followed by adopting green lease ordinances that require all buildings in their jurisdictions to implement efficiency upgrades at the time of lease or sale or at other trigger points – such as financial transactions that result in change of ownership, occupancy, or financing; replacement of major equipment; or building remodeling or renovation – using cost and savings sharing formulas identified in the lease.⁹² Establishing a model green lease ordinance that can be adopted by all interested local governments would foster public sector leadership.

“What is needed is a way to transform at least part of the [Energy Efficiency] industry into regionally based ‘lean green retrofit machines’, including as-needed ‘Job Order Contracting’ and integrated building commissioning services.”

Christine Vance
San Francisco
Public Utilities Commission

Key Strategy

VP 4.1: *Work with state, regional, and local governments to improve the energy performance of public buildings and encourage upgrades of privately owned buildings.*

Public buildings can set an important example for other existing buildings. Engagement is needed with state, regional, and local governments, regional energy networks, and school districts to collect, compare, and store baseline energy performance data in a common and accessible database, and to leverage economies of scale when contracting for upgrades. Working with state and local leaders (for example, SoCal REN and the State of California) and learning from their experiences is particularly important. Building partnerships with private sector market actors is also important to share lessons learned and best practices and to understand how the public effort might be scaled toward small and medium nonresidential buildings to reduce the costs of efficiency upgrades. To further reach the private sector, local governments could establish requirements for buildings to implement cost-effective upgrades when a building is leased.

the three year term of the contract.” San Francisco Water Power Sewer, <<http://www.sfwater.org/bids/bidDetail.aspx?bidid=2732>>, accessed June 10, 2013.

90 Christine Vance and Terry O’Sullivan, “Striking While the Climate is Hot: New Program Design for Accelerated Delivery of Energy Retrofit Projects,” paper presented at ACEEE Summer Study, Pacific Grove, August 15-20, 2010.

91 *Green lease* is a term without a widely accepted definition, but it generally applies to a lease that sustains the “green” principles of a green building to ensure that the building is operated and maintained in an environmentally friendly and sustainable way.

92 Any conflicts that may arise between green lease ordinances and existing rent control ordinances will need to be addressed.

Key Initiatives

1. Develop energy use information for public buildings by working with workforce, education, and training entities; regional energy networks; state, regional, and local building owners; and school districts to collect baseline data on public building energy performance.
2. Develop a statewide web-based municipal building benchmarking application for use by regional energy networks; state, regional, and local governments; and school districts to prioritize and track efficiency upgrade projects.
3. Develop a municipal building job order contracting process similar to the model developed by the San Francisco Public Utilities Commission.
4. Develop and promote the use of one or more model green lease ordinances.
5. Develop a comprehensive and expandable benchmarking and disclosure database that is web-accessible and better informs the public of the energy use of state-owned buildings.

Potential Stakeholders

Federal, state, and county offices and agencies; state, municipal, county, and regional government agencies that own or operate buildings; private building owners that lease to public agencies; utilities; regional energy networks; enforcement agencies; community colleges; state colleges and universities; nonprofit and community-based organizations.

Voluntary Pathway 5: Energy Efficiency in Property Valuation

Overview

One of the most important unrealized market opportunities is the systematic recognition of the value of energy efficiency upgrades as capital assets when nonresidential and residential buildings are being appraised. Including energy efficiency in the property valuation and appraisal processes will require a systematic, reliable, and objective way to compare energy efficiency assets that exist in the building.

VISION FOR ENERGY EFFICIENCY IN PROPERTY VALUATION

The quality and integrity of a building's energy performance is reflected in market attributes and realized property valuation.

The real estate market is affected by many economic factors. In nonresidential buildings, these factors include energy costs. A nonresidential building that can demonstrate lower operating costs than similar buildings as a result of energy efficiency features or designs will have a competitive advantage recognizable to the marketplace (Figure 11).⁹³ In addition, studies indicate that investment in residential and nonresidential energy efficiency upgrades today will lower energy bills far into the future, often beyond the financing period and even beyond the ownership term of the entity making the investment.⁹⁴ Along with energy cost savings, upgrades in residential and nonresidential buildings provide nonenergy benefits such as improved comfort and better indoor air quality. In nonresidential buildings, upgrades can increase worker productivity, which has the potential to further reduce operating costs.⁹⁵

Property appraisals must formally recognize the value added by residential and nonresidential energy efficiency upgrades. In Los Angeles County, for example, green

"[I]f conservation improvements do not increase a property's 'bottom line' value...their costs can only come out of the property's equity, which is to the detriment of not only the seller, but to energy efficiency and improvement programs throughout the state."

Jennifer Svec
California Association of Realtors

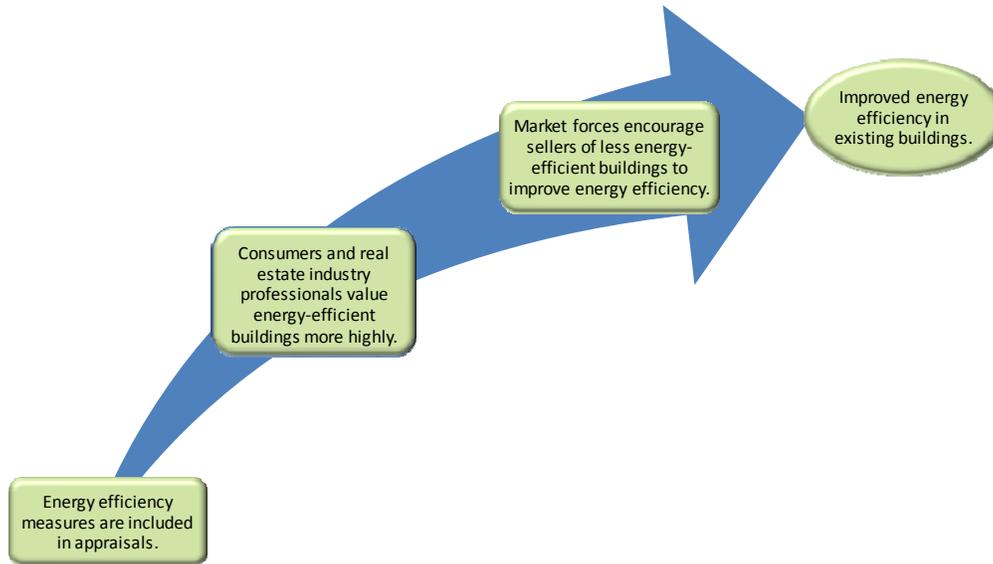
93 Nils Kok and Matthew E. Kahn, *The Value of Green Labels in the California Housing Market: An Economic Analysis of the Impact of Green Labeling on the Sales Price of a Home*, Sustainable Property Research, July 2012; Anthony Guma, Chris Pyke, and Charles Leitner III, "Current Trends in Green Real Estate," webinar presented at quarterly series, CoStar, Washington, D.C. 2011; Anthony Guma, "Recognizing Higher Value in Efficient Buildings," paper presented at ACEEE Energy Efficiency Finance Forum, Boston, May 8, 2012.

94 Mark Fulton, Jake Baker, and Margot Brandenburg, *United States Building Energy Efficiency Retrofits: Market Sizing and Financing Models*, Deutsche Bank Climate Advisors and The Rockefeller Foundation, New York, March 2012; Hannah Choi Grandade, Jon Creyts, Anton Derkach, et al, *Unlocking Energy Efficiency in the U.S. Economy*, McKinsey & Company, July 2009; Greg Kats, Aaron Menkin, Jeremy Domm, et al, *Energy Efficiency Financing – Models and Strategies: Pathways to Scaling Energy Efficiency Financing From \$20 Billion to \$150 Billion Annually*, Capital E for the Energy Foundation, Washington, D.C., October 2011.

95 "Looking Beyond Energy Lower Costs," Rocky Mountain Institute, <http://www.rmi.org/RFGraph-looking_beyond_low_energy_costs>, accessed March 14, 2013.

upgrades have increased the value of homes by 5.5 percent to 9 percent.⁹⁶ In the nonresidential sector, building owners and other decision makers need to understand that energy upgrades will make buildings more desirable, increasing rental income and the return on investment.⁹⁷

Figure 11: Inclusion of Energy Efficiency in the Property Valuation and Appraisal Processes



Source: California Energy Commission

Valuations of energy efficiency upgrades must meet market needs, be designed for accuracy and ease of application, and encourage energy efficiency improvements. A tool that could assist in the property valuation and appraisal processes is a standardized rating system. However, to successfully add value to a property, efficiency rating approaches will need to be widely accepted, understood, and integrated into established transaction processes by key market actors. These can include appraisers, home and commercial building inspectors, operators and users of multiple listing services, real estate agents, and lenders. Collaboration and engagement with stakeholders are needed to ensure that any system adopted in California reflects the needs of the marketplace and does not hinder market transactions. A public process could determine how best to incorporate energy efficiency performance metrics into property

“[It will be necessary] to work with property assessors to develop meaningful monetary values to energy efficiency upgrades, which will have positive impacts on the value of a home. This would encourage building owners to undergo efficiency upgrades during ownership and recuperate some added value to property sale.”
 Tamara Rasberry
 Sempra Energy Utilities

⁹⁶ Energy Upgrade California, <https://energyupgradeca.org/county/los_angeles/news/green_upgrades_increase_value_of_los_angeles_homes_by_5_dot_5_to_9_percent-2586>, accessed on March 14, 2013.

⁹⁷ Kok and Kahn, p. 3.

valuations and appraisals. Pilot programs could then be conducted to test implementation and evaluate participant responses and resulting behavior changes.

Key Strategy

VP 5.1: *Achieve market transformation by incorporating energy efficiency performance into property valuation and appraisal processes.*

The real estate property valuation market is driven by financial transactions. Mortgage companies and banks rely on appraisals as the primary tool to determine the value of properties and assess risk.⁹⁸ As the market recognizes the financial value of energy efficiency upgrades in residential and nonresidential buildings, it will be important to incorporate the value into the appraisals. This will require collaboration and engagement with real estate industry professionals.

Key Initiatives

1. Establish agreements with key market actors regarding incorporating efficiency asset values into established property market processes.
2. Conduct pilot projects in local regions to demonstrate the value of energy efficiency upgrades in conjunction with property values.
3. Provide incentives and marketing support for participants to incorporate energy efficiency upgrade information in sales, property valuation, and appraisal processes.
4. Evaluate results of pilot projects, including assessment of homeowner, contractor, and other market actors' perceptions and behavior changes.

Potential Stakeholders

Federal and state agencies; real estate industry professionals; building industry professionals; existing upgrade and green label program implementers; residential and nonresidential building officials and inspectors; multiple listing services operators and users; financing entities; and nonprofit organizations.

98 Dwight Jaffee, Richard Stanton, and Nancy Wallace, "Energy Efficiency and Commercial-Mortgage Valuation," paper presented at the Fisher Center Working Papers Series, Berkeley, September 13, 2011, <<http://faculty.haas.berkeley.edu/jaffee/Papers/DOE2913.pdf>>, accessed June 7, 2013; Piet Eichholtz, Nils Kok, and John M. Quigley, "The Economics of Green Buildings," paper presented at Strengthening the Green Foundation Conference, Atlanta, March 10-11, 2011, <[http://cbey.yale.edu/uploads/Environmental%20Economics%20Seminar/EKQ%20082010%20JMQ%20\(2\).pdf](http://cbey.yale.edu/uploads/Environmental%20Economics%20Seminar/EKQ%20082010%20JMQ%20(2).pdf)>, accessed June 7, 2013.

Voluntary Pathway 6: Encourage Development of Innovative Financing Mechanisms for Energy Efficiency Upgrades

Overview

Financing is an important component of an energy upgrade program and enables capital intensive upgrades in existing buildings. However, lack of accessible and affordable financing has been identified as a major barrier to building owner investments in energy upgrades.⁹⁹ The economic downturn has made it more difficult for property owners to acquire secured or unsecured financing, with certain geographic areas hit harder than others resulting in slower recovery and continued commercial vacancy rates along with reduced access to capital.¹⁰⁰ The mortgage and finance industries need to develop new finance products to support energy improvements with terms that homeowners, commercial building owners, and the public sector can easily access and afford.

VISION FOR FINANCING UPGRADES

Promote financing opportunities and policies that enable maximum energy efficiency upgrades in all existing building sectors in California.

There are also barriers within each subsector of residential and nonresidential buildings. Perhaps the single greatest barrier is the split incentive issue in leased and rental properties, where the building owner does not pay utility bills and therefore has no incentive to invest in improving the energy efficiency of the building. A second consideration is the ownership and mortgage structure. For example, in the residential sector, multifamily buildings – which represent about 30 percent of housing units – present a special challenge since they are divided into market-rate housing and affordable housing, each with unique characteristics in terms of how they are financed and their ability to incur additional debt for energy improvements. While market-rate multifamily properties are part of the residential sector in utility rates and programs, lenders consider market-rate multifamily project financing as a specialized type of commercial lending. Affordable multifamily housing development is also a complex and specialized area of residential development. Financing an affordable multifamily housing upgrade project can involve many resources from multiple levels of government funneled through multiple programs. In the small commercial and small public sector buildings sectors, most efficiency improvements are paid out of cash on hand and utility rebates or

“Financial institutions need to assess investment risks, which is best supported by measured performance data, incorporated into probability distributions of cost savings from existing building efficiency improvements.”

Walker Wright
SunRun

99 California Public Utilities Commission, *Decision Providing Guidance on 2013-2014 Energy Efficiency Portfolios and 2012 Marketing, Education, and Outreach*, D. 12-05-015, May 18, 2012; *Technology Roadmap Energy-Efficient Buildings: Heating and Cooling Equipment*, International Energy Agency OECD/IEA, Paris, 2011, <www.iea.org>, accessed February 1, 2013; Matthew H. Brown, David S. Carey, David Nemetzow, et al, *Recommendations for Energy Efficiency Finance Pilot Programs*, Harcourt, Brown & Carey, New York, October 19, 2012, <<http://www.caleefinance.com/wp-content/uploads/2012/10/EE-Finance-Pilot-Recommendations-Report4.pdf>>, accessed February 1, 2013.

100 J.D. Miller, *Emerging Trends in Real Estate 2010*, the Urban Land Institute and PricewaterhouseCoopers, LLP, Washington, D.C., October 2009, p. 3.

government grants to schools. Performance contracting through energy service companies has been the traditional source of energy financing for large public building sectors along with loan guarantees and industrial development bonds.

Financial products need to be easily accessible and take into account the effect of financing terms on the borrower's monthly cash flow. Consumer protection must also be integrated to ensure customers receive what they pay for and that upgrades meet building energy efficiency standards for additions and alterations, including quality installation of equipment. Lower interest rates and longer-term lending would assist investment and increase the volume of projects, allowing for development of more targeted financial products.

A 2011 study by Harcourt, Brown & Carey suggested that capital investment of more than \$4 billion a year is necessary for the next 10-15 years to achieve California's energy efficiency goals.¹⁰¹ The CPUC authorized \$3.1 billion in ratepayer funded energy efficiency programs for the 2010-2012-program cycle or roughly \$1 billion per year.¹⁰² About half of the budget is for rebates and incentives to reduce efficiency project investment costs, meaning it represents about one-eighth of the annual investment needed. Some portion of this investment will be offset by energy savings from energy upgrades, which can achieve from 25 percent to more than 40 percent energy savings.¹⁰³ Although the investments from IOU ratepayers and government-approved funding are substantial, they are spread over various programs throughout the state and do not approach the level of investment needed. A critical step in closing this investment gap is working with the private financial community to provide standardization, predictability, and scale in energy efficiency financing.¹⁰⁴

Starting in 2006, the CPUC authorized Sempra Utilities to offer a small program for on-bill financing (OBF). OBF uses ratepayer funds as the sole source of capital in a revolving loan, with loan repayments made through utility bills. To be exempt from state banking and lending regulations, Sempra agreed with requirements from the California Department of Financial Institutions that loans could not be offered to consumers or charge interest. The CPUC expanded this to a statewide program for all IOUs for the 2010-2012 cycle and authorized \$75 million in funding. For 2013-2014, funding was expanded to around \$100 million. To protect the risk exposure from using only ratepayer funds for loan capital, loans are limited to five years and \$100,000 per meter except for government facilities.

101 *Energy Efficiency Financing in California Needs and Gaps: Preliminary Assessment and Recommendations*, Harcourt, Brown & Carey, New York, July 8, 2011, pp. 64-65.

102 Energy efficiency portfolio funding for the 2010-2012 cycle was \$3.1 billion. California Public Utilities Commission, *Decision Approving 2010 to 2012 Energy Efficiency Portfolios and Budgets*, Decision 09-09-047, CPUC, San Francisco, September 24, 2009; California Public Utilities Commission, *2010-2011 Energy Efficiency Annual Progress Evaluation Report*, CPUC, San Francisco, September 2012.

103 See Grandade, et al.

104 Greg Kats, Aaron Menkin, Jeremy Dommu, et al, *Energy Efficiency Financing – Models and Strategies: Pathways to Scaling Energy Efficiency Financing From \$20 Billion to \$150 Billion Annually*, Capital E for the Energy Foundation, Washington, D.C., October 2011; Joel Freehling, "Energy Efficiency Finance 101: Understanding the Marketplace," White Paper, ACEEE, Washington, D.C., August 2011, p. 2; Fulton, et. al.

California needs to increase the scale of investment in energy efficiency somewhere in the range of 4 to 10 times the scale of current activity. Achieving this will require uniform platforms and lending requirements that can attract capital at scale and with fast, automated transaction systems for loan origination, servicing, and profiling credit risks to secondary financial markets that can enable capital access on a large scale and at terms attractive enough to engage property owners.

American Recovery and Reinvestment Act-Funded Programs

In recent years, the number and variety of energy efficiency finance programs have dramatically increased.¹⁰⁵ The Energy Commission invested ARRA funding in different finance pilots in a variety of sectors, including the following. While some programs were successful, they have not reached the desired scale given the vast potential in the housing sector.

“The most significant barriers to success are institutional and financial, not technical.”

*Bob Knight
Bevilacqua-Knight, Inc.*

- The California Rural Home Mortgage Finance Authority (CRHMFA) Homebuyers Fund (CHF) for single family energy upgrades.
- Sonoma County’s revolving loan fund to support the Sonoma County Energy Independence Program residential Property Assessed Clean Energy (PACE) program.
- The Bay Area Multifamily Fund offered by the San Francisco Mayor’s Office of Housing.
- Los Angeles County’s suite of financing programs for single family, municipal, and state-owned buildings.
- Commercial PACE programs in San Francisco, Los Angeles, and Placer County.
- The Department of General Services-administered revolving loan fund for state-owned buildings.

Collaborative Activity

The Energy Commission has administered successful energy efficiency loan, grant, and technical assistance programs for more than 30 years, including the Energy Conservation Assistance Program, the Bright Schools Program, the Energy Partnership Program, and the Institutional Conservation Program. As California pursues its energy efficiency goals, the Energy Commission will continue to collaborate with the CPUC, other government organizations, and financial institutions to promote financing solutions.

The Energy Commission also supports the CPUC’s recent leadership in creating finance program offerings in response to direction in AB 758. The CPUC arranged for an analysis of efficiency financing market gaps and needs which was published in 2011. Based on that analysis and public input, the CPUC directed the IOUs to invest \$200 million in energy efficiency financing during 2013-2014.¹⁰⁶ The CPUC held public workshops and instructed the IOUs to commission an independent consultant to propose detailed financing programs for specific needy market

105 Greg Kats, Aaron Menkin, Jeremy Dommu, et al; Joel Freehling, p. 2; Fulton, et al.

106 California Public Utilities Commission, *Decision Providing Guidance on 2013-2014 Energy Efficiency Portfolios and 2012 Marketing, Education, and Outreach*, D. 12-05-015, May 18, 2012, <http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/166830.PDF>, accessed May 24, 2013.

segments for piloting in 2013 with the intention of bringing them to scale in 2014 in the IOU service territories.¹⁰⁷ The funding for the financing programs represents about 10 percent of the total 2013-2014 energy efficiency portfolio. Financing programs for 2013-14 are budgeted at \$214 million and include the continuation of the statewide on-bill financing program for nonresidential customers and various ARRA-era programs for residential and nonresidential customers, including regional energy network-proposed programs in the newly formed SoCal REN, Bay Area Regional Energy Network (BayREN), and the Marin Energy Authority.

Statewide pilot programs included in the \$214 million budget allocation are subject to a decision expected from the CPUC in June 2013. Proposals for statewide finance pilots include nonresidential on-bill repayment with credit enhancement for equipment leases and energy efficiency upgrades and without credit enhancement for renewable energy, distributed generation, storage, and similar resources. Proposals also call for single family and multifamily residential credit enhancement programs. An insurance pilot program designed to use third-party performance guarantees as a substitute for utility-based EM&V processes is also being proposed. It is the CPUC's goal to support a statewide uniform system of leveraged statewide private sector financing products and to retire the existing plethora of programs that are local or regional or rely excessively on ratepayer funding.

The Energy Commission will also continue collaborating with the California Alternative Energy and Advanced Transportation Financing Authority (CAEATFA), which has broad authority to develop a variety of financing programs. CAEATFA has issued Qualified Energy Conservation Bonds (QECBs), investigated issuance of Private Activity Bonds and, in July 2012, launched the Clean Energy Upgrade Financing Program for the single family and multifamily residential sectors. CAEATFA offers a loan loss reserve to financial institutions that provide loans to finance installation of energy efficiency upgrades or distributed generation renewable energy sources on residential properties. CAEATFA continues to revise its program regulations as appropriate to increase program demand.

Key Strategies

VP 6.1: *Continue successful existing financing programs for energy efficiency upgrades; promote improvements in those programs through a process of continuous quality improvement with the long-term goal of maximizing private capital investment.*

Public programs and ratepayer funding is at less than half what is needed per year to fund energy upgrades in all building sectors in the state. Many long-term funding programs address specific building sectors, leaving others with only limited support. Established programs not only provide benefits beyond immediate energy savings, but also provide a foundation for targeting and expanding coordinated energy efficiency programs that assist all customers.

¹⁰⁷ Ibid, p. 19; Brown, et al, p. 7; The subsequent recommendations and ultimate approval of some of the programs are detailed in California Public Utilities Commission, *Decision Approving 2013-2014 Energy Efficiency Programs and Budgets*, D.12-11-015, CPUC, San Francisco, November 2012.

Ratepayer funding is subject to regulatory proceedings and may be focused toward particular economic sectors in an effort to fill market gaps.

Key Initiatives

1. Implement IOU and regional energy network financing programs required by the CPUC.
2. Continue Energy Commission ARRA-funded financing programs.
3. Continue to enhance and coordinate Energy Conservation Assistance Act programs, including Tax Exempt Revenue Bonds, Energy Partnerships, and Bright Schools Revolving Loan Programs.
4. Support and expand CAEATFA's loan loss reserve residential upgrade financing program.
5. Support and enhance the State Assistance Fund for Enterprise, Business and Industrial Development revolving loan fund.
6. Develop a public building revolving loan program that leads to a revenue bond program to leverage loan funds with the Department of General Services, the Department of Corrections and Rehabilitation, California's courts, and other jurisdictions.
7. Work with publicly owned utilities to bring successful programs to their territories.

VP 6.2: *Strategically target public sector support to address the needs of borrowers and lenders to develop the ability to offer attractive financing terms, options, and programs for energy upgrades throughout the state.*

Demand will drive financial innovation. An opportunity exists for the private sector to create demand for energy upgrade programs that are streamlined and supported statewide through coordinated efforts, which may help to fill financing gaps. Government organizations have used the private lending community to further programs such as CAEATFA's loan loss reserve program and to provide loans and grants through various programs. However, these limited efforts fall far short of the level of investment needed to transform California's energy efficiency market. Further investigation is needed of opportunities to increase and expand public and private funding through conventional financing mechanisms and new products that also include credit enhancements and risk protection. Examples include Energy Efficient Mortgages and other U.S. Department of Housing and Urban Development financing, federal loan guarantees, Private Activity Bonds, Tax Exempt Financing for Municipalities, statewide legislation, and QECBs).

Key Initiatives

1. Develop targeted sector-specific financial products.
2. Increase private sector financial institution engagement through coordination, quality assurance, and loan performance data facilitation.
3. Increase contractor knowledge and integration of financing tools and products into their sales transaction strategies.
4. Continuously maintain information about the range of available financing options and provide information and training to potential borrowers, contractors, and other building industry market actors.
5. Develop information and tools to educate banks, lending institutions, local governments, and community development agencies about energy benefits, payback, and investment for energy performance upgrades. Closely monitor and evaluate financing product performance and support the most successful approaches.
6. Monitor and identify continuing gaps in property-owned access to financing tools to determine possible remedies and implement if feasible.
7. When appropriate, promote leasing of equipment for energy upgrade projects similar to current solar leases.
8. Support programs that reduce default risk through loan loss reserves and interest rate buy-downs. Extend successful existing revolving loan fund programs, loan insurance and guarantee programs, industrial development bond programs, and pooled bond financings.
9. Promote underwriting guidelines that support the state's building energy performance policies, mandates, and goals.

Potential Stakeholders

Federal and state agencies; California's utilities; local and regional governments, including counties, cities, schools, and special districts; finance companies and lending institutions; California's courts; building officials; enforcement agency professionals; building, real estate, and contractor associations; research and education institutions; nonprofit and business organizations; and building owners, property managers, and landlords.

CHAPTER 4: POTENTIAL MANDATORY APPROACHES

Potential Mandatory Approach 1: Statewide Energy Use Disclosure Program for Largest Commercial and Public Buildings

Overview

Stakeholders have cited a lack of energy performance data as a critical barrier to the development of the energy efficiency marketplace.¹⁰⁸ Public disclosure of energy use benchmarks could improve the flow of data, encourage improvements in building energy performance, and provide valuable information to building tenants and the public.

California was the first state in the nation to enact energy use disclosure legislation, AB 1103 (Saldaña, Chapter 533, Statutes of 2007), which requires energy use disclosure at the time of sale, lease, or finance of a commercial building.¹⁰⁹ California's *Green Building Action Plan*, which implements the requirements in Governor Brown's Executive Order B-18-12 for public buildings to take a leading role in energy efficiency, requires state agencies to provide data on energy use by facilities and individual buildings that they own, or leased space where the state pays utilities, along with an annual report of energy use to the Department of General Services.¹¹⁰ The Energy Commission is working with the Department of General Services to facilitate this public disclosure of energy use in public buildings.

Several U.S. cities – including Washington, DC, Austin, New York City, Seattle, Philadelphia, San Francisco, and Minneapolis – have also enacted policies requiring commercial and public buildings 50,000 square feet or larger to benchmark and publicly disclose their energy use annually.¹¹¹ Such policies can increase the availability of energy performance data and allow energy efficiency to be valued in lease and purchase negotiations. Several studies have suggested that there is a statistically significant increase in rental price, sales price, and occupancy rate for commercial buildings with energy efficiency in the top 25

“Buildings currently operate like a car with the speedometer hidden in the glove compartment, and the gasoline bill at the end of the month. Displaying building performance data will boost system performance just by the fact that it is visible.”

*James Finlay
Wells Fargo*

108 Comments on the October 8 & 9, 2012 Workshops on the Comprehensive Energy Efficiency Program for Existing Buildings, California Energy Commission,” especially Dockets, TN-68019, TN-68200, TN-67993, TN-68008, TN-67991, TN-68034, and TN-67697.

109 California Energy Commission, *Nonresidential Building Energy Use Disclosure Program Proposed Regulations: California Code of Regulations, Title 20, Division 2, Chapter 4, Article 9, Sections 1680 - 1685*, California Energy Commission, Sacramento, February 2013, CEC-400-2010-004-CMF, <<http://www.energy.ca.gov/2010publications/CEC-400-2010-004/CEC-400-2010-004-CMF.pdf>>.

110 *Green Building Action Plan – For Implementation of Executive Order B-18-12*, <http://gov.ca.gov/docs/Green_Building_Action_Plan_B.18.12.pdf>, accessed April 28, 2013; also see “Executive Order B-18-12,” Office of Governor Edmund G. Brown Jr., <<http://gov.ca.gov/news.php?id=17508>>, accessed April 28, 2013.

111 Institute for Market Transformation, <<http://www.imt.org/performance-policy/us-policies>>, accessed April 28, 2013.

percent of their peer group.¹¹² While it is too early to conclusively determine the effect of benchmarking on energy consumption and property values when disclosure is mandated, projections indicate that ratings and disclosure policies could have a significant effect on the U.S. property market.¹¹³ The U.S. EPA found an average energy savings of 2.4 percent per year in buildings that consistently benchmark their energy use.¹¹⁴

California will continue to monitor the lessons learned from other cities and countries and, as the energy efficiency marketplace matures, the Energy Commission will evaluate the need for a public proceeding to determine whether mandatory disclosure of energy performance data in large commercial and public buildings would be appropriate and feasible.

One successful approach to mandatory disclosure is the National Australian Built Environment Rating System (NABERS), which accelerated the implementation of an existing voluntary rating tool by requiring its use in government buildings, followed by a mandatory disclosure requirement in large privately owned office buildings.¹¹⁵ To meet increasing demand for highly rated buildings, NABERS has expanded its rating scale to differentiate between “excellent” buildings and those that are merely “very good.”

If it were determined that a mandatory approach would be useful and feasible for California, one possibility could be to have public and private owners of large buildings responsible for benchmarking annual energy use using the U.S. EPA’s Portfolio Manager web-based tool.¹¹⁶ Utilities could then use Portfolio Manager’s automated data exchange protocols established for AB 1103 to upload the building energy consumption data to Portfolio Manager. A secure data warehouse could be established to house this energy use benchmark data, which would need to be updated annually, using an available open database platform such as the U.S. DOE’s Standard Energy Efficiency Database.

112 Jerry Jackson, “How Risky Are Sustainable Real Estate Projects? An Evaluation of LEED and ENERGY STAR Development Options,” *The Journal of Sustainable Real Estate*, Vol.1, No.1, 2009, p.91; Gary Pivo and Jeffrey D. Fisher, “Income, Value, and Returns in Socially Responsible Office Properties,” *The Journal of Real Estate Research*, Vol. 32, No. 3, Jul/Sep 2010, p. 243; Jonathan A. Wiley, Justin D. Benefield, and Ken H. Johnson, “Green Design and the Market for Commercial Office Space,” *The Journal of Real Estate Finance and Economics*, Vol. 41, No. 2, 2010, pp. 228-243; Franz Fuerst and Patrick McAllister, “Green Noise or Green Value? Measuring the Effects of Environmental Certification on Office Values,” *Real Estate Economics*, Vol. 39, No. 1, 2011, pp. 45–69; “Energy Efficiency and Property Value,” Institute for Market Transformation, <<http://www.imt.org/performance-policy/efficiency-and-value>>, accessed April 28, 2013.

113 Andrew C. Burr, Caroline Keicher, and David Leipziger, *Building Energy Transparency: A Framework for Implementing U.S. Commercial Energy Rating and Disclosure Policy*, Institute for Market Transformation, Washington, D.C., July 2011, pp. 3-4. <http://www.imt.org/uploads/resources/files/IMT-Building_Energy_Transparency_Report.pdf>; Gregg Kats and Jeff Perlman, *Summary of the Financial Benefits of ENERGY STAR Labeled Office Buildings*, U.S. EPA, February 2006, <http://www.energystar.gov/ia/partners/publications/pubdocs/Summary_of_the_Financial_Benefits_23June06_FINAL.pdf>. <<http://www.imt.org/performance-policy/efficiency-and-value>>, accessed May 16, 2013.

114 “Benchmarking and Energy Savings,” Energy Star, <http://www.energystar.gov/ia/business/downloads/datatrends/DataTrends_Savings_20121002.pdf>, accessed April 28, 2013.

115 Paul Bannister, *NABERS: Lessons from 12 Years of Performance Based Ratings in Australia*, paper presented at International Conference for Enhanced Building Operations, Manchester, England, October 23-26, 2012, <<http://icebo2012.com/cms/resources/uploads/files/papers/43%20NABERS%2012%20years%20paper%20-%20final.pdf>>.

116 Energy Star Portfolio Manager, http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager, accessed June 5, 2013.

Key Strategy

PMA 1.1: *Evaluate the need for and feasibility of a statewide energy use disclosure program for the largest commercial and municipal buildings in California.*

The demand for energy-efficient Class A office space in urban areas has been increasing steadily over the last decade. Companies that supply these spaces have recognized that they can profit from benchmarking and disclosing their energy use. Other areas and sectors of the commercial real estate market could also benefit from robust data on the benefits of benchmarking and energy use disclosure.

Easily accessible energy use data is critical for the energy efficiency marketplace to reach maturity. A more comprehensive statewide energy use disclosure program for the largest commercial and public buildings would make energy use data more widely available, but further research and evaluation are needed to determine the need for and potential timing of any kind of mandatory disclosure program. Such a program would need to balance the need for disclosure with the compliance time and costs to businesses. In evaluating the need for mandatory strategies, it will be essential to work with stakeholders and learn from experiences in other cities. For example, San Francisco and New York City documented and discussed with stakeholders the economic benefits of their proposed programs and identified approaches to minimize adverse impacts on businesses.

Key Initiatives

1. If mandatory approaches are deemed necessary and feasible, conduct a public workshop to evaluate the pros and cons of energy use disclosure for large public and private buildings. Highlight and discuss lessons learned and best practices from experience in leadership cities with local disclosure programs.
2. Develop and track key metrics on the readiness of the market to evaluate the need for and timing of a mandatory disclosure program.
3. Collaborate with state agencies to encourage public buildings to be early leaders and potentially disclose their energy usage on a public website.
4. If findings from initiative 1 support mandatory disclosure, conduct a public rulemaking with participation from all affected stakeholders to establish future requirements for public disclosure of annual energy use and related energy performance benchmarks for large public and private buildings.
5. Investigate resources needed to establish a publicly accessible website to publish building energy use and energy performance benchmarks and the possible use of U.S. DOE's Standard Energy Efficiency Database.

Potential Stakeholders

Federal and state agencies; nonprofit organizations; local and regional governments; building owners and operators of large private buildings; and education and outreach partners.

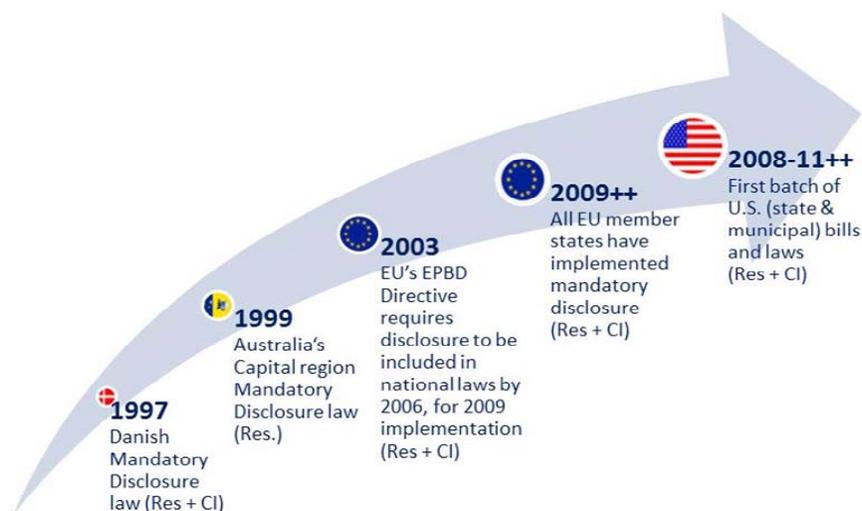
Potential Mandatory Approach 2: Disclosure of Ratings and Completion of Basic Energy Upgrades for Existing Buildings

Overview

Given the scale of California's energy efficiency goals for existing residential and nonresidential buildings, they may be challenging to achieve through voluntary actions alone. Stakeholder comments have indicated there may be a need for mandatory strategies.¹¹⁷ Mandatory disclosure of energy performance ratings and completion of basic level energy efficiency upgrades could help overcome information barriers and support the energy efficiency upgrade market,¹¹⁸ and could also move California beyond what can be accomplished by voluntary early adopters and incentive program participants by reaching out to the broader population. With disclosure of the energy performance of most if not all buildings, the market is much more likely to appropriately value energy efficiency investments.¹¹⁹

Mandatory asset ratings and upgrades are being pursued throughout the United States and around the world, including the European Union and China (Figure 12).

Figure 12: Mandatory Disclosure Around the World



Source: Dunsky Energy Consulting

In the United States, Massachusetts is piloting asset ratings in nonresidential buildings, Portland and Austin mandate energy efficiency upgrades for high energy use buildings, and the cities of Berkeley and San Francisco have for many years required energy efficiency upgrades for existing buildings. When this action plan is finalized and implementation begins, the Energy

117 Comments on the October 8 & 9, 2012 Workshops on the Comprehensive Energy Efficiency Program for Existing Buildings, California Energy Commission, especially Docket Number TN-67997 and TN-68000.

118 Burr, et al, pp. 3-4; also see Kats and Perlman.

119 *An MPG Rating for Commercial Buildings: Establishing a Building Energy Asset Labeling Program in Massachusetts*, White Paper, Massachusetts Department of Energy Resources and Industrial Economics, Inc., Boston, December 2010; Philippe Dunsky, Jeff Lindberg, Eminé Piyale-Sheard, et al, *Valuing Building Energy Efficiency Through Disclosure and Upgrade Policies: A Roadmap for the Northeast U.S.*, Dunsky Energy Consulting, Montreal, November 2009.

Commission envisions an open public process to evaluate the benefits and drawbacks of mandatory requirements in California, with input from key stakeholders and market actors on the needs of and potential impacts on the marketplace.

If mandatory approaches are deemed necessary, they should be designed to extend the market penetration of upgrades that can be achieved through voluntary approaches alone. Two possible approaches could be mandatory disclosure of energy performance ratings and mandatory completion of basic level energy efficiency upgrades, with both approaches having specific completion dates to allow enough lead-time for building owners to determine the best timing for them to act. These approaches could create a “glide path” for voluntary compliance in advance of the specified completion date, during which outreach, information, and technical assistance could be provided to the marketplace along with information on financing and incentive opportunities. Financial incentives could be made available to building owners who voluntarily comply and to market actors who encourage and facilitate voluntary compliance. Approaches may also need to coordinate asset ratings with the emergence of smart meters and new tools to evaluate and present smart meter data to consumers.

“Mandatory actions are critical to reach all existing buildings and require a clear path from the Energy Commission for implementation to ensure a workable phase-in of such approaches.”

Lara Ettenson and
David Goldstein
Natural Resources Defense Council

There is great potential from disclosure of energy performance ratings and completion of basic-level energy efficiency upgrades at “trigger point” events such as financial transactions that result in change of ownership, occupancy, or financing; replacement of major equipment; or building remodeling or renovation.¹²⁰ These trigger points can be viewed as targeted events where voluntary compliance should be particularly encouraged and incited; by using a “date certain” approach, the entire population of existing buildings in California could be reached, not just buildings that are at a particular “trigger point” event.

If mandatory approaches are determined to be necessary and desirable, they should be developed in open proceedings that address special considerations. These considerations could include the need for phased approaches to account for differences in building types; the intensity of the energy use of a building compared to other buildings; the climate where the building is located; how dependent California’s energy systems are on energy and demand savings in that climate; building ownership (state, local government, low-income subsidized, residential, or nonresidential); the feasibility of

“[Even] if the rate of program uptake were to triple, without leadership from agencies like the Energy Commission, it is highly unlikely that California will reach its ambitious goals for energy efficiency in existing buildings by 2020.”

Sachu Constantine
California Center for
Sustainable Energy

120 Comments on the October 8 & 9, 2012 Workshops on the Comprehensive Energy Efficiency Program for Existing Buildings, California Energy Commission, Docket Number TN-68003 and TN-68018.

cost-effective upgrades; and the ability to achieve nonenergy benefits associated with the upgrades.¹²¹

Significant research, documentation of market conditions, and analysis would be needed before implementation of any mandatory requirements. Implementation would need to be well-designed to facilitate, monitor, and enforce compliance with the requirements, as well as comply with the AB 758 requirements to avoid unreasonably or unnecessarily affecting the home purchase process or the ability of individuals to rent housing, and to avoid invalidating a transfer of property because of failure to comply.

Stakeholders play a pivotal role in California achieving its energy efficiency goals. For any kind of mandatory strategy to be successful, key stakeholders and market actors need to collaborate and communicate a plan, understand the effects it has on each industry, and ensure that no one industry is overburdened. There would need to be significant buy-in from market actors for such processes to be implemented and accepted as the “new normal.” California’s economy is recovering so it is important when considering any mandatory approach that it does not negatively impact the overall economy, but rather serves to stimulate the building industry and support the energy efficiency marketplace as a whole.

Key Strategy

PMA 2.1: *Evaluate the need for and feasibility of mandatory approaches; if such approaches are deemed necessary and feasible, conduct a public proceeding to develop requirements for disclosure of energy performance ratings on existing residential and nonresidential buildings, and consider the case for required completion of basic energy efficiency upgrades on existing residential and nonresidential buildings.*

Billions of dollars are spent annually on building purchases without a systematic way to consider building energy use when determining building value. This can adversely affect the market for energy efficient buildings and prevent building owner investments from being properly compensated by the market.

Key Initiatives

1. If mandatory approaches are deemed necessary and feasible, conduct a public process to evaluate the pros and cons of mandatory disclosure of energy performance metrics for all buildings. In the same or a separate public process, consider the cases for requiring completion of basic energy efficiency upgrades.
2. If mandatory disclosure is shown to be a useful and necessary approach, determine the extent to which the “date certain” requirements should be conditional on key factors.

121 Ibid, Docket Number TN-67997; also see Burr, et al.

3. Establish administrative structures that implement procedures to effectively facilitate, monitor, and enforce compliance with the “date certain” requirements that is well-coordinated with other marketplace structures and practices so as to minimize the burden of compliance while achieving the desired private and societal benefits.
4. Develop approaches that result in an effective “glide path” for voluntary compliance in advance of the “date certain,” supported by effective public information, financing opportunities, technical assistance, and incentives for building owners and key actors in the process who encourage and facilitate voluntary compliance.

Potential Stakeholders

Federal and state agencies; local and regional governments; utilities; enforcement agency professionals; real estate industry professionals; building industry professionals; building industry associations; multiple listing services operators and users; utility and regional government program implementers; building owners; advocates; and nonprofit and community-based organizations.

CHAPTER 5: MEASURING PROGRESS, COORDINATION & OVERSIGHT, AND NEXT STEPS

The long-term success of the Comprehensive Energy Efficiency Program for Existing Buildings will require: establishing robust metrics for success and developing an information infrastructure to track them consistently and reliably; learning from the diverse array of experiences taking place under the AB 758 umbrella and effectively incorporating the lessons moving forward; and establishing a high-level oversight structure and supporting processes that ensure accountability while avoiding duplication of existing efforts.

Tracking Progress and Enabling Success

Any effort to monitor growth of the existing building upgrade marketplace must include determination of a system of metrics and collection of consistent, longitudinal information to support their tracking over time. No Regrets Strategy 1 is intended to respond, in part, to this fundamental need. Metrics might include, for example, number of projects, dollar value of the projects, number of certified contractors, energy intensity by participants versus non-participants, overall energy intensity by geographical area, among many others. Costs and how they evolve over time will be especially useful to understand. Data resources for market tracking ought to contain both participant and non-participant data and should cover the entire state—including inputs from all utility, local, and regional program implementers—capturing the full array of evaluation, measurement, and verification (EM&V) studies. A joint agency process with additional stakeholder workshops will inform and develop the proper metrics for success and high-level approaches for quantifying and tracking the metrics. Issues such as data content and structure, reporting requirements, and confidentiality and security concerns must be resolved. Stakeholder input on metrics and a metric tracking structure is encouraged.

The CPUC evaluates IOU efficiency programs to determine program performance, to provide information for program improvement, develop new procedures, measure energy savings, and ultimately ensure that the state can depend on energy efficiency as a resource. Senate Bill 1037 (Kehoe, Chapter 366, Statutes of 2005) requires publicly owned utilities to provide annual reports to their customers and the Energy Commission on their investments in energy efficiency programs, and Assembly Bill 2021 (Levine, Chapter 734, Statutes of 2006) requires publicly owned utilities to report on third-party EM&V of program savings. EM&V activities include savings measurement and verification, program evaluation, market assessment, performance metrics, policy and planning support, and financial and management audits.¹²² This body of existing EM&V work provides a starting point for determination of appropriate metrics. Broadening these analyses to capture the evolving baseline, which includes both attributable and unattributed savings, seems a logical step.

122 California Public Utilities Commission, *2013-2014 Energy Division – Investor Owned Utility Energy Efficiency Evaluation, Measurement and Verification Plan: Version 1*, CPUC, San Francisco, January 31, 2013.

An effective EM&V system will have the capability to explicitly track and interpolate market metrics over time. This includes the ability to indicate how specific initiatives or programs affect the structure or function of markets and the behavior of participants in those markets. When possible, it is helpful to know what positive changes programs have caused in the marketplace, in order to enable attribution of energy savings from individual energy efficiency programs and demonstrate that they are accomplishing their goals. At the same time, market evolution may result from many disparate events, so independent assessment of higher level trends is complementary.

It is imperative to support the research community by providing sufficient data to enable insight on key questions. Some examples of relevant research areas may be found in the Electric Program Investment Charge triennial investment plan currently under review by the CPUC, including:¹²³

- Building occupant behavior and consumer motivation to increase and sustain energy savings when efficiency improvements are made in buildings.
- Cost-effective retrofit strategies to achieve greater energy efficiency in existing buildings.
- Reduction of energy use by plug load devices through development of products, systems, and controls, and evaluation of consumer behavior affecting energy use.

Coordination & Oversight

Existing building efficiency programs must be well-coordinated to share information, leverage scarce resources, and evaluate successful efforts to improve the penetration and performance of energy efficiency activity. The Energy Commission envisions creation of an oversight group that includes key policy makers and stakeholders representing a wide array of industries and interested parties including state and public agencies, utilities, program implementers and administrators, local and regional governments, industry leaders and representatives, legislative leaders, and consumer advocates. The oversight group would meet semi-annually to review progress and provide input to the agencies on effectiveness of the current suite of initiatives and the needs of the marketplace. Oversight group participants will share common goals, commitment to open process, and emphasis on rapid progress. The oversight group will seek advice from established groups and committees, as well as from organizations conducting research and evaluations to aid in the decision-making process. The public will also have input at open forum meetings.

¹²³ Silas Bauer, Beth Chambers, Pamela Doughman, et al, *The Electric Program Investment Charge: Proposed 2012-2014 Triennial Investment Plan, Staff Report*, California Energy Commission, Sacramento, 2012, CEC-500-2012-082-SF, <<http://www.energy.ca.gov/2012publications/CEC-500-2012-082/CEC-500-2012-082-SF.pdf>>, accessed May 15, 2013; California Public Utilities Commission, *Phase 2 Decision Establishing Purposes and Governance for Electric Program Investment Charge and Establishing Funding Collections for 2013-2020, Rulemaking 11-10-003, (Decision 12-05-037)*, CPUC, San Francisco, May 31, 2012, <http://docs.cpuc.ca.gov/word_pdf/FINAL_DECISION/167664.pdf>, accessed May 15, 2013.

Next Steps

The Energy Commission will hold three workshops in June 2013 in San Francisco, Los Angeles, and Fresno on this *Draft Action Plan for the Comprehensive Energy Efficiency Program for Existing Buildings*. In addition to stakeholder feedback on the proposed strategies in this plan, the Energy Commission is seeking input on which entities should be responsible for implementing the various strategies and on possible sources of funding for implementation activities. After considering all public input, the plan will be finalized and released in early fall of 2013, and will be subsequently considered for adoption by the Energy Commission.

Once adopted, implementation efforts will begin, and the Energy Commission will continue to review and update the action plan, in collaboration with the CPUC, starting in the *2014 Integrated Energy Policy Report* proceeding. Throughout the process, the Energy Commission will continue to work closely with state, local, and other agencies to ensure that consistent information is used among all parties to develop energy policies and decisions affecting the state.

Other future activities are anticipated to include the following:

- Continued collaboration between stakeholders and other market actors, members of the public, and local, state, and federal agencies will be imperative to maximize energy savings.
- Research to identify all data sources that are currently available to provide information on California's existing buildings and identify data elements that need to be collected and stored.
- Statewide studies to determine the extent to which permits are being obtained and compliance is being achieved.
- Market research to better understand customer attitudes toward energy efficiency and incorporate the results into outreach and marketing messages, tactics, and tools to increase public awareness.
- Updating of Commission regulations regarding data collection, to support AB 758 implementation and other Commission duties.
- Evaluation of the extent to which progress in the energy efficiency marketplace indicates that mandatory approaches are necessary and feasible.
- If mandatory approaches are determined to be necessary and feasible, conduct public proceedings to establish future requirements for disclosure of energy performance benchmarks of large public and private buildings; disclosure of energy metrics for all buildings; and completion of basic level energy efficiency upgrades.

ACRONYMS

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| AB | Assembly Bill |
| ARRA | American Recovery and Reinvestment Act of 2009 |
| ASHRAE | American Society of Heating, Refrigerating and Air-Conditioning Engineers |
| BayREN | Bay Area Regional Energy Network |
| BMS | building management system |
| BOA | Building Optimization Analysis |
| CAEATFA | California Alternative Energy and Advanced Transportation Financing Authority |
| CHF | CRHMFA Homebuyers Fund |
| CPUC | California Public Utilities Commission |
| CRHMFA | California Rural Home Mortgage Finance Authority |
| CSI | California Solar Initiative |
| EM&V | evaluation, measurement, and verification |
| EPIC | Electric Program Investment Charge |
| GHG | greenhouse gas |
| GWh | gigawatt hour |
| HVAC | heating, ventilation, and air-conditioning |
| IOU | investor-owned utility |
| JOC | job order contracting |
| kW | kilowatt |
| kWh | kilowatt hour |
| LEED | Leadership in Energy and Environmental Design |
| ME&O | marketing, education, and outreach |
| MMTh | million therms |
| NABERS | National Australian Built Environment Rating System |
| PACE | Property Assessed Clean Energy |
| QECBs | Qualified Energy Conservation Bonds |
| REN | regional energy network |
| SoCal REN | Southern California Regional Energy Network |
| U.S. DOE | United States Department of Energy |
| U.S. EPA | United States Environmental Protection Agency |
| ZNE | zero net energy |

GLOSSARY

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| AB 1103 (Saldaña, Chapter 533, Statutes of 2007) | Requires building owners to benchmark and disclose to a prospective buyer, tenant, or lender the energy performance of a building. |
| AB 32 (Núñez, Chapter 488, Statutes of 2006) | Requires California to reduce greenhouse gas emissions to 1990 levels by 2020. |
| AB 758 (Skinner, Chapter 470, Statutes of 2009) | Requires the Energy Commission to establish and assess, and utility companies to implement, a plan to improve energy efficiency in existing buildings. |
| American National Standards Institute | A 501(c)3 private not-for profit organization that administers and coordinates the United States voluntary standardization and conformity assessment system. |
| American Recovery and Reinvestment Act (ARRA) | An economic stimulus package passed by Congress in 2009 to create new jobs, spur economic activity and long-term growth, and foster unprecedented levels of accountability and transparency in government spending. |
| appraisal | The act of estimating the value of real estate by a person who is licensed. |
| asset rating | Represents a building's energy use regardless of occupant behavior. |
| baseline performance level | The level of performance of a building's components that impact its energy consumption prior to upgrades. |
| benchmarking | Comparing a building's performance metrics to those of similar buildings in the same area. |
| best practice | A method or technique that has consistently shown results superior to those achieved with other means and is used as a benchmark. |
| building as a system | The concept that the performance of one component in a system depends on other components in the system, ultimately affecting the performance of the entire building. |
| Building Energy Asset Rating System | A system developed by the Energy Commission to rate the energy performance of existing buildings to support efforts to improve energy efficiency in existing commercial buildings. |
| building management system | A computer-based control system that controls and monitors a building's mechanical and electrical systems, including ventilation, lighting, power, fire, and security. |
| Building Optimization Analysis tool | A spreadsheet-based tool designed to streamline and standardize the energy savings calculation process for engineering service providers working under retrocommissioning programs for five California utilities. |

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| Building Performance Institute | A leading developer of technical standards for Home Performance and weatherization retrofit work that are recognized across North America. From these standards, BPI has developed training programs, professional credentialing for individuals, company accreditations and quality assurance programs for the industry. |
| Calculated Incentive Program | A program by Southern California Gas Company which provides standardized monetary incentives and nonmonetary awards for business energy efficiency projects involving the installation of new, high-efficiency equipment or systems. |
| California Home Energy Rating System (HERS) | A uniform rating system that can serve to differentiate the energy efficiency levels of California homes and prioritize by cost-effectiveness potential energy efficiency improvements. |
| career pathway | An integrated collection of programs and services intended to develop students' academic and technical skills, provide them with continuous education and training, and place them in high-wage, high-opportunity jobs. |
| commercial building | A structure in which at least 50 percent of the occupied floor space is used for things other than residential or civic functions. |
| commissioning | The process of ensuring that newly constructed buildings and their systems are designed, installed, functionally tested, and capable of being operated and maintained according to the owner's operational needs. |
| credit enhancement | A method whereby a company attempts to improve its debt or credit worthiness. Through credit enhancement, the lender is provided with reassurance that the borrower will honor the obligation through additional collateral, insurance, or a third party guarantee. Credit enhancement reduces credit/default risk of a debt, thereby increasing the overall credit rating and lowering interest rates. |
| economizer | Devices on air-conditioning units that allow fresh air to be drawn into the building at times when cooling is required and the outside temperature of the air is suitable to provide that cooling. |
| energy audit | An assessment of how much energy a home consumes and a set of recommendations for ways to decrease the home's energy usage. Audits take a variety of forms, from the simplest do-it-yourself version to the more comprehensive versions conducted by certified building analyst or rater. |

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| energy efficiency | The amount of energy required to provide the same level of services for buildings such as space conditioning, lighting, and ventilation. |
| energy performance data | A presentation of the energy used by, and the physical and operational characteristics of, buildings. |
| Energy Savings Assistance Program | A program which provides no-cost weatherization services to low-income households who meet specific income guidelines. |
| Energy Upgrade California | California’s brand for residential and small business energy efficiency improvement. |
| green lease | Generally applies to a lease that sustains the “green” principles of a green building to ensure that the building is operated and maintained in an environmentally friendly and sustainable way. |
| Home Energy Professionals Project | A U.S. Department of Energy project in collaboration with the home energy performance industry that creates standard work specifications, advanced professional certifications for workers, and accredited training programs. |
| Interstate Renewable Energy Council | A nonprofit organization accelerating the use of renewable energy and energy efficiency since 1982. |
| Leadership in Energy and Environmental Design (LEED) | A program that provides third-party verification of green buildings geared toward the unique needs of a project or building type. |
| loan loss reserve | The portion of a bank’s cash or cash equivalents holdings set aside to cover estimated potential losses in its loan portfolio. |
| market actors | Providers of energy efficiency services, technologies, or products, financial institutions, and energy consultants interested in achieving the goals of the AB 758 Plan. |
| Marketing, education, & outreach (ME&O) | A multipronged strategy for communication to various constituents. |
| multifamily | A housing classification in which multiple separate housing units for residential inhabitants are contained within one building or several buildings within one complex. |
| municipal building | Public buildings that are owned by and serve a municipality. |
| nonresidential building | A building not used for residential or civic functions. |
| North American Technician Excellence | The nation’s largest nonprofit certification organization for heating, ventilation, air-conditioning, and refrigeration technicians and the only technician certification organization governed, owned, operated, developed, and supported by the heating, ventilation, air-conditioning, and refrigeration industry. |

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| on-bill financing | Utility programs that use ratepayer funds as capital for no interest revolving loans for energy efficiency and renewable electricity generation projects that customers repay through their monthly utility bills, with the energy savings typically offsetting the cost of the loan. |
| on-bill repayment | Allows residential and commercial property owners to finance energy efficiency and renewable electricity generation projects through cost-savings loans from third-party investors. The loans are repaid through customers' utility bills and financed at no additional cost to ratepayers. Allows for longer term loans with lower interest rates. |
| plug load | The energy used by appliances powered by standard electrical outlets. |
| Property Assessed Clean Energy (PACE) financing | Financing mechanism that enables local governments to finance renewable energy and energy efficiency projects on private property, including residential, commercial and industrial properties. The programs eliminate the chief barrier to clean energy installations-- the large upfront cost-- by offering the property owner a loan that can be repaid in fixed payments as part of their property tax bill. A local government creates an improvement district; a bond, secured by real property within the district, is issued; and the bond proceeds are used to fund renewable energy and energy efficiency projects. |
| property valuation | An estimate of what a building or piece of land is actually worth; the price at the time of sale may be higher or lower. |
| retrocommissioning | The process of ensuring that existing buildings and their systems are designed, installed, functionally tested, and capable of being operated and maintained according to the owner's operational needs. |
| revolving loan fund | A financing measure primarily used for small business development projects such as energy efficiency upgrades. The central fund is replenished as individual projects repay their loans, creating the opportunity to for further lending. |
| single-family building | A single residential unit not attached to other residential units. |
| smart meter | A device that connects homes and businesses to the electric grid with two-way communication with a utility to manage demand on the grid, increase service and reliability, and allow customers to make more informed choices about energy consumption. |

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| stackable credentials | A sequence of credentials that can strengthen an individual's qualifications and help them to move along a career pathway or up a career ladder. |
| triple net lease | A lease agreement that designates the lessee (the tenant) as being solely responsible for all of the costs relating to the asset being leased in addition to the rent fee applied under the lease. The structure of this type of lease requires the lessee to pay for net real estate taxes on the leased asset, net building insurance and net common area maintenance. |
| upgrade | The installation of more efficient equipment or energy saving measures into a building prior to the existing equipment's failure or end of its economic life. |
| whole-house approach | Incorporating building science principles to comprehensively assess existing conditions of a home's energy usage, as well as how all the systems within the home interact. This assessment is then used to create a detailed work scope, or plan, to achieve the greatest energy savings for the home over a long period of time. A whole home program relies on properly trained and certified technicians to complete the installation of measures incorporating best practices to nationally recognized standards, typically followed up with third-party quality assurance inspections. |
| zero net energy building | A building with energy usage that does not exceed the energy produced onsite by renewable generation. |