

CA | Energy Efficiency Strategic Plan

Strategic Plan Progress Report

Prepared by Energy Division,
pursuant to D.09-09-047

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1 Introduction

Background

The California Long-term Energy Efficiency Strategic Plan (Strategic Plan or Plan), published in 2008 and updated in 2011 by the California Public Utilities Commission (CPUC), sets ambitious efficiency goals for the state, including achieving zero net energy (ZNE) new construction in the residential sector by 2020 and commercial sector by 2030.¹ The Plan was crafted to include a combination of efforts to achieve these goals, ranging from utility programs to codes and standards to market initiatives. The investor-owned utilities' (IOUs') 2010-2012 portfolios were the first to embrace the Strategic Plan as a guiding framework. This report to CPUC Commissioners responds to Decision (D.) 09-09-047 (at 331), wherein Energy Division was directed to prepare a Strategic Action Plan Progress Report this year.

Overall Strategic Plan Progress

The Strategic Plan has had some significant successes. This mid-term 2011 report provides just a small sampling of the broad range of energy efficiency activities in the state, and in particular key accomplishments at the Commission.

- In D.09-09-047, the IOUs' \$3.1 billion portfolio of energy efficiency programs began to be aligned with Strategic Plan initiatives to a considerable extent.
- In 2010, the Commission augmented the Plan with a lighting chapter, adopted in D.10-09-047, filling out a major gap in the original plan.
- These accomplishments, as well as the development of action plans and a Strategic Plan newsletter (described below), have continued to build momentum and demonstrate that indeed there is potential for a market transformation "movement" across California.

This movement, as envisioned by the Plan, will help establish "long-lasting sustainable changes by reducing barriers to the adoption of energy efficiency measures to the point where further publicly funded intervention is no longer appropriate."²

Action Plans

With stakeholders, the Energy Division initiated the development of action plans (APs), which provide an action-oriented, project management framework for implementation of each Plan chapter.³ Action plans for commercial ZNE (September 2010), HVAC (June 2011), and lighting (July 2011) have been developed and launched in collaboration with stakeholders. These sectors were prioritized for action plans because of their large impact on energy consumption; the commercial sector is the largest electricity consuming sector in California; HVAC accounts for 30% of peak energy demand; and lighting represents 25% of statewide electrical energy consumption and (historically) 50% of utility program portfolio savings. Action plans for residential ZNE, industrial, and research and technology are currently underway.

As shown in the representative figure below, these action plans (a) specify and prioritize key actions to achieve milestones in the Plan, (b) identify champions⁴ to pursue these actions, (c)

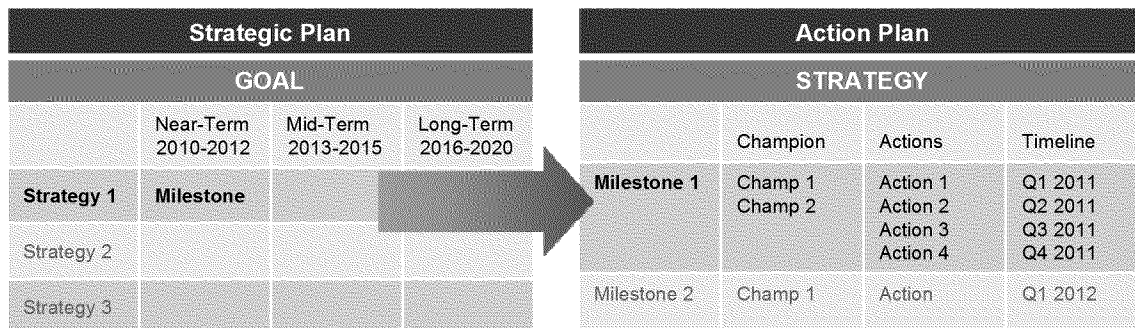
¹ CPUC 2011, Strategic Plan. Originally published in 2008 and updated in 2011 to include the Lighting chapter. Available at www.cpuc.ca.gov/NR/rdonlyres/A54B59C2-D571-440D-9477-3363726F573A/0/CAEnergyEfficiencyStrategicPlan_Jan2011.pdf

² CPUC 2011, Strategic Plan, p. 4.

³ An action plan is designed to identify the key actions required to achieve milestones, secure leaders for the steps to achieve these actions, and track and report on progress against the Strategic Plan. For examples of the commercial ZNE, HVAC and lighting action plans, please visit <http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/eesp/>

⁴ A core focus of the Strategic Plan is continued engagement with the broader stakeholder community, including manufacturers, contractors, local governments and others. This group called the Champions Network is made up of

track progress on each strategy, and (d) communicate the status of overall progress for a given chapter. Stakeholders are directly involved in developing action plans. The Action Plans themselves are developed through a stakeholder consensus process. The Commission has clarified that “action plans are not part of the formal energy efficiency (EE) proceeding because they will not set new rules or policies or mandate actions by the IOUs or be adopted by the Commission.”⁵ To date, individuals from 50 organizations have volunteered as champions. Champions are listed alongside their milestones in the actual action plans.



Quarterly Updates through Strategic Plan Newsletter

Finally, as directed in D.09-09-047 (at 332), Energy Division launched the quarterly California Energy Efficiency Strategic Plan newsletter.⁶ This on-line publication provides regular updates on action plans, activities and events, stakeholder interviews and other information relevant to the advancement of the Strategic Plan.

Barriers to Success

Despite these notable achievements, the Strategic Plan faces many barriers to continued progress. There is a real risk that the Strategic Plan will not meet its goals, unless the next decade sees a more concerted effort on the part of the IOUs, state and federal agencies and market actors. Some of the constraints California faces include an unprecedented state budget deficit, which has hampered the ability to timely hire and retain staff at the CPUC and the California Energy Commission (CEC) to oversee progress on strategic action plans. The Energy Foundation fellowship, which for the past two years provided a major resource advancing the Strategic Plan in California, ended in July 2011. Some of the Strategic Plan’s goals can be realized through existing vehicles (e.g., efficiency programs of California’s IOUs and/or collaborative efforts with other state agencies). Still, fully achieving the Plan goals will require sustained leadership and new approaches to organization and funding of this ambitious long-term agenda.

Contents of this Report

Each sector addressed in this report contains the following information:

- **Overview:** This section provides a short summary of the importance of a particular sector in the Plan, as well as an assessment of overall progress to date.
- **Progress Indicator (when available):** Originally developed for action plans, progress indicators are given for those sectors which have action plans. These are project

volunteers (many already working on some aspect of the action plan in their professional work) who take responsibility for helping to achieve milestones identified in the Strategic Plan.

⁵ D.10-09-047, p. 7.

⁶ www.cpuc.ca.gov/eenews_images/2011Winter/EENewsletter_webpage_0110.html

management-style (percent complete) indicators.⁷ These indicators are meant to give a “bird’s eye view” of achievement, as well as areas where additional resources or support may be needed to stay “on track” relative to the Plan’s goals. Progress indicators are only given for Commercial ZNE, HVAC, and Lighting, because these were vetted by stakeholders in the action plan development process. These indicators are derived by working with champions to determine the status and timeline of key actions to achieve a near-term milestone.

- **Select Progress Highlights**: This section provides examples of progress, which may include accomplishments from a cross section of the public and private sectors. While there are many more examples of progress than space allows in this report, these short synopses demonstrate laudable achievements towards the goals of the Strategic Plan.
- **Investor Owned Utility (IOU) Programs to Advance the Plan**: This section provides a sampling of new, innovative utility programs or activities that directly address needs and milestones called out in the Strategic Plan. Examples include continuous energy improvement (CEI), ZNE pilots, HVAC quality maintenance (QM), and the workforce education and training (WE&T) Needs Assessment.
- **Priorities for the Future**: This section suggests needs for greater attention or change to accelerate progress and address challenges (e.g., a change that could have a “domino effect” on the market and adoption of key strategies in Plan). These items reflect views of various Action Plan participants, ranging from state agency staff to utilities and market stakeholders. Some priorities discussed pertain to action plans while others point to possible updates to the Strategic Plan itself.

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⁷ For each milestone, there are an established number of actions. Progress is measured as “percentage complete” by dividing the status and the number of actions completed (or in progress) by the total number of actions.

2 Residential

Overview

Targeted as one of the Big Bold Energy Efficiency Strategies (BBEES)⁸ and one of the largest and most diverse end-use sectors, the residential sector represents 32 percent of total state electricity consumption and 36 percent of its total natural gas consumption.⁹ As described in the Strategic Plan, California's ultimate vision for the residential sector is that energy use is "transformed to ultra-high levels of energy efficiency resulting in zero net energy (ZNE) new buildings by 2020."¹⁰ For existing homes, the goal is to reduce energy consumption by 40% by 2020.¹¹ This chapter's focus is on three residential strategies:

- ZNE for all new single and multi-family homes by 2020,
- implementing whole house energy upgrades for existing homes, and
- reducing plug loads.

In terms of progress towards milestones identified in the residential chapter, the Plan has helped to focus codes and standards on driving "continual advances in technologies in the building envelope" (measured as percentage over Title 24). Consistent with the Strategic Plan, the *2007 Integrated Energy Policy Report (IEPR)* established a goal that Title 24 standards achieve "net zero energy" levels by 2020 for residences and by 2030 for commercial buildings. To transform that goal into reality, the CEC is establishing both mandatory standards and "reach" standards to support the piloting of ZNE and advanced energy efficiency features as part of the 2013 Title 24 update. Altogether, some 30 California cities and counties have approved these local "reach" building codes, per the 2008 voluntary statewide CALGreen building standard that extends beyond the energy efficiency focus of the CEC's Title 24 work, to also address indoor air quality and water efficiency.¹²

Progress is also happening through efforts like Energy Upgrade California (EUC) (see description below), behavior pilot programs, and coordination forums such as the Home Energy Retrofit Coordinating Committee.¹³ Yet, an overall acceleration of residential strategies is needed. Reducing energy use in existing buildings will require changes in consumer purchasing patterns, research to develop smarter products, and commercialization of these plug load saving products. Just as important, innovative financing solutions need to become widely available to Californians to be able to afford deep energy retrofits and ZNE new homes. Assembly Bill 758 (Skinner, 2009) calls for the CEC to develop a comprehensive statewide program to retrofit existing buildings, and for the CPUC to investigate the ability of utility ratepayer funds to help finance such a program. The CEC is proceeding on its work on a multi-year schedule, building up components of a full market infrastructure to deliver on this mandate.

Select Progress Highlights

- **Energy Upgrade California (EUC).** A partnership of state and local agencies, investor owned and public utilities, financing entities, non-profits and other organizations, EUC is

⁸ See D.07-10-032.

⁹ CPUC 2011, Strategic Plan, p. 9.

¹⁰ *Ibid.*, p. 9.

¹¹ *Ibid.*, p.11.

¹² CALGreen provides a comprehensive green building standard and two additional voluntary tiers that include energy efficiency requirements exceeding Title 24 by 15 percent and 30 percent respectively.

¹³ For more information, go to www.multifamilygreen.org/technical-resources/home-energy-retrofit-coordinating-committee. Also, see the multi-family HERCC recommendations report available at this site.

the largest home energy upgrade program of its kind in the nation. The EUC program offers comprehensive home energy diagnostic assessments, IOU (and in some cases, local government) rebates up to \$4,000 per home, home energy ratings (similar to a miles-per-gallon rating for homes), and financing solutions (via a “one-stop-shop” website).

- **Zero Energy Homes Design Competition.** In late 2011, Pacific Gas & Electric (PG&E) and the American Institute of Architects (AIA) will be launching a competition to encourage the design and building of ZNE homes.
- **Installation of Smart Meters.** To date, under the Automated Metering Infrastructure (AMI and including “smart meters”) initiative, millions of smart meters have been installed across IOU service territories. This enables more precise recording of customer energy consumption and promises that future use of home area network (HAN) communication systems and visual displays will better track and manage “house-as-a-system” operations. This data and communications infrastructure will be vital to achieving ZNE in the built environment.
- **Energy Efficiency Financing Report.** Pursuant to Assembly Bill (AB) 758 and D.09-09-047, Energy Division in July released a consultant report providing a preliminary assessment and recommendations on how to address EE financing needs and gaps to meet the goals of the Strategic Plan and AB 758.¹⁴ This report already is helping to inform the work of the CPUC and market stakeholders to identify the most promising financing mechanisms, and explore how ratepayers might support financing tolls to implement the AB 758 program the CEC is expected to develop.

IOU Programs Underway to Advance the Plan

- **Whole House Retrofit Program (a.k.a “Energy Upgrade California”):** A central effort to drive the Strategic Plan’s residential goals, this utility rebate program offers customers up to \$4,000 per home for installation of a comprehensive package of energy savings measures (e.g., air sealing, attic insulation, duct sealing, insulation of hot water, combustion safety, and permanent lighting fixtures and controls). Available in two offerings – the prescriptive and performance (custom) packages – this program is coordinated with components supported by local government and federal program funding also coordinated through Energy Upgrade California.¹⁵
- **California Advanced Homes Program (CAHP)** . Through a pay-for-performance incentive structure and a whole-building approach, CAHP is designed to increase market demand for new energy efficient multifamily and single-family homes by encouraging builders to exceed Title 24 standards by 15 to 45 percent. This program is a cornerstone to create market supply for ZNE homes.
- **Business and Consumer Electronics Program** . As a first step to addressing plug loads and enabling ZNE, this new program provides rebates for the purchase of more efficient TVs, computers, and set-top boxes. Energy-saving power strips and additional electronics are under evaluation for inclusion in the program, complementing the state’s current focus to help regulate battery chargers and other “ghost” loads.¹⁶

Priorities for the Future

¹⁴ Harcourt, Brown and Carey, July 2011, “Energy Efficiency Financing in California: Needs and Gaps – Preliminary Assessment and Recommendations,” Draft report submitted to CPUC Energy Division.

¹⁵ For more information go to the Energy Upgrade California website, available at <https://energyupgradeca.org/overview>

¹⁶ For example, effective 2012, the CEC adopted new Title 20 appliance efficiency standards for battery chargers to make them 40 percent more efficiency.

- **AB 758 program implementation .** Targeting retrofits of all existing buildings in California, the development and implementation of this program should emerge as a leading driver of energy efficiency retrofits in the years ahead. The CEC this year launched its work to develop the program over a multi-year period.
- **Raise awareness.** The statewide marketing energy and outreach program for energy efficiency, and Energy Upgrade California, the statewide building energy retrofit brand, were born into the consumer communications world to build awareness, inspire action, and drive Californians towards energy management solutions that support Strategic Plan goals. Both campaigns have their own plans to focus on increasing visibility, expanding communications and coordinated messaging about energy efficiency – one focused on energy use and behavior broadly, and the other focused specifically on investing in building improvements.
- **Expand Home Monitoring Solutions and Manage Plug Loads.** Progress has been made via utility programs, AMI deployment, and private market offers (e.g., collectively via behavior solutions offered by OPOWER, Efficiency 2.0, and others) to advance in-home energy management solutions. But, the potential of these solutions has barely been tapped. California can reap substantial efficiency gains by expanding plug load regulation (e.g., such as the CEC’s leadership on TV, computer and set box efficiency standards in 2010) to complement voluntary programs that give homeowners tools to minimize energy use drive towards “zero.”
- **Integrate with the “ZNE Industry.”** Energy Upgrade California and other efforts (e.g., energy efficiency requirements for participating in the California Solar Initiative program) have helped to bring the energy efficiency and solar distributed generation (DG) communities together. But, more effort is needed to collaborate with vendors and integrators of other ZNE-enabling technology, including demand response (DR) technologies, to offer fully integrated energy management solutions as standard practice.
- **ZNE Definition.** In 2011, ZNE commercial “champions” convened to discuss and offer a clearly articulated ZNE definition for the Energy Division, CEC and other stakeholders to consider. The intent is to clarify ambiguities and suggest ways to recast ZNE goals in terms that are easy to understand and market to the building and property industries, while preserving ZNE policy principles.

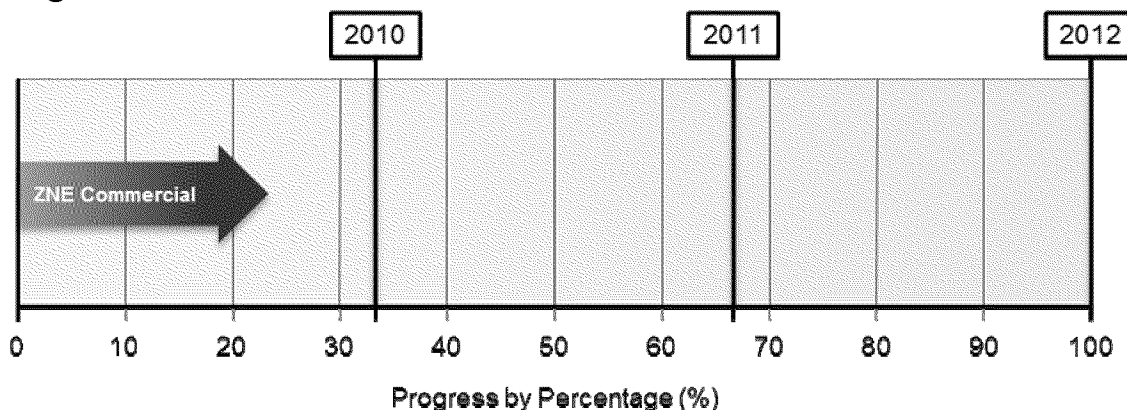
3 Commercial “Path to Zero”

Overview

Commercial buildings consume more electricity than any other end-use sector in California. The sector’s 5 billion-plus square feet of space is highly diverse—not only office buildings but also retail stores, restaurants, warehouses, schools, hospitals, public buildings and others¹⁷—accounting for 38 percent of the state’s power use and over 25 percent of natural gas consumption. For this reason, the Strategic Plan places a strong focus on transforming the commercial building stock of California, with aggressive goals to move the building industry toward ZNE in all new buildings and 50 percent of existing buildings by 2030.

To date, California has more ZNE buildings (residential and commercial) than any other state in the nation (5 of 18 buildings nationwide).¹⁸ The Strategic Plan has influenced utility programs to have new features that support achieving zero energy commercial buildings. California’s state agencies are focused on substantial reduction of building energy use, and private efforts (including from the architectural, engineering and green building communities) are targeted to fundamentally reduce energy demands of the built environment. As noted previously, the CEC has adopted the Strategic Plan’s long-range ZNE goals for commercial new construction. With this concerted multi-party effort focused on ZNE buildings, California is on the path to transform how buildings are designed, constructed and operated.

Progress



Source: Zero Net Energy Action Plan for Commercial Buildings, 2010.

Currently at approximately 25 percent complete for the 2010-2012 period, the commercial “Path to Zero” is about half as far along as had been hoped by mid 2011. With the recession all but stopping new construction activity, progress on ZNE new buildings has slowed. Yet, this also presents an opportunity for the industry to re-tool itself for growth using ZNE practices. The recession has caused a greater focus on existing buildings, which present the greatest challenge. Existing buildings need to radically accelerate the use of aggressive retrofits, commissioning strategies, and integrated design solutions. This requires more “turnkey” approaches and

¹⁷ Federal, state and local governmental buildings and facilities are categorized as “commercial” and implicitly included in the strategies of the commercial chapter and periodically differentiated as warranted. Additionally, local governmental buildings are discussed extensively in the local government chapter of this Strategic Plan.

¹⁸ U.S. DOE’s Zero Energy Buildings Database available at <http://zeb.buildinggreen.com/>

attractive financing targeted to each building type and market segment. At present, it is unclear if California will make its ZNE goals by 2030. Stakeholders to the Commercial ZNE Action Plan have suggested it may be a better use of resources to focus on a 40-50 percent reduction or making buildings “ZNE ready” to make the goals more achievable.

Select Progress Highlights

- **Commercial ZNE Action Plan.** With stakeholders, the Energy Division launched an action plan for the commercial sector in September 2010.
- **Energy Efficiency Financing Report.** Pursuant to AB 758 and D.09-09-047, the Energy Division released a consultant report providing a preliminary assessment and recommendations on options for addressing EE financing needs and gaps in the mechanisms currently available to meet the goals of the Strategic Plan.¹⁹ This report will inform the Energy Division’s recommendations to the CPUC on how ratepayers should fund or finance the AB 758 program that CEC develops.
- **Governor’s Green Building Initiative (GBI).** Signed on December 14, 2004, the GBI established a goal for state-owned buildings to reduce energy usage by 20 percent by 2015, and encouraged the private commercial sector to set the same goal. In May 2009 the California Solar Initiative (CSI) reported approximately 276 MW of installed and pending projects in the Commercial and Institutional sectors. As of July 2009 the 2010-2012 EE programs were projected to result in 4,140 GWh and 961 MW in total estimated first-year annual energy savings for commercial, state, and federal and local government buildings.²⁰ For the calendar year 2010, the joint IOUs have reported energy savings from commercial, state, and local government programs at 893 GWh and 193 MW as of May 2011.
- **National Efforts.** The U.S. Department of Energy’s (U.S. DOE’s) Zero Energy Commercial Buildings Consortium (CBC),²¹ along with the Architecture 2030 Challenge²² and the Living Building Challenge²³ are helping to drive awareness and providing education nationally. Specific efforts include the DOE’s current proposal for a national commercial building asset rating program, and development of the High-Performance Green Building Clearinghouse. Lastly, the Army announced 17 installations for a “Net Zero Energy, Water and/or Waste Contest”, with six zero net energy installations selected.²⁴
- **Mandates for Commercial Buildings.** In February 2011 San Francisco adopted an ordinance that requires commercial property owners to benchmark the energy performance of their buildings, make energy ratings available to the public and conduct energy audits every five years. As of January 2011, the City of Los Angeles amended their municipal code to incorporate “CALGreen” standards for all new buildings, all additions, and both residential and non-residential alterations with building valuations over \$200,000.²⁵

IOU Programs to Advance the Plan

¹⁹ Harcourt, Brown and Carey, July 2011, “Energy Efficiency Financing in California: Needs and Gaps – Preliminary Assessment and Recommendations,” Draft report submitted to CPUC Energy Division. Available at www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/Programs/.

²⁰ <http://docs.cpuc.ca.gov/PUBLISHED/GRAPHICS/107663.PDF>

²¹ <http://zeroenergycbc.org/>

²² http://architecture2030.org/2030_challenge/the_2030_challenge

²³ <https://ilbi.org/lbc>

²⁴ <http://dodenergy.blogspot.com/2011/04/final-veil-army-announces-net-zero.html>

²⁵ <http://ladbs.org/LADBSWeb/green-bldg.jsf>

- **Benchmarking.** In D.11-04-055, D.09-09-047 was modified to require PG&E to benchmark at least 50,000 buildings; Southern California Edison (SCE) 50,000 buildings; and San Diego Gas & Electric (SDG&E) 20,000 buildings. In their July 1, 2011 report to Energy Division, the IOUs reported benchmarking a total of 4,793 buildings in 2010.
- **PG&E Zero Net Energy (ZNE) Pilot Program.** This program supports the Strategic Plan by initiating research, development, and demonstration (RD&D) projects that have aggressive energy efficiency goals and that plan to include onsite clean distribution generation.²⁶
- **Sustainable Communities Program.** Run by the southern California IOUs, this program provides design/technical assistance, training, and other professional resources to new construction projects that incorporate sustainable/green building practices on large-scale master planned projects and unique, smaller scale, ZNE projects.
- **Savings By Design.** This program offers the nonresidential building industry a multi-faceted suite of solutions that encourages energy-efficient building design and construction practices by offering up-front design assistance and financial incentives based on project performance.²⁷
- **On-Bill Financing (OBF).** This program offers zero-percent interest financing with on-bill repayment to qualifying non-residential customers who participate in IOU programs. OBF facilitates the purchase and installation of efficiency retrofit measures by building owners who might not otherwise be able to invest due to capital constraints and/or administrative and time burdens involved in obtaining traditional project financing. An initial loan pool of \$41.5 million was authorized, and as of September 2011 some \$30.5 million had been loaned.

Priorities for the Future

- **AB 758 program implementation.** Targeting retrofits of all existing buildings in California, the development and implementation of this program remains a huge opportunity to tackle California's existing building stock. The CEC has initiated its work program and envisions putting in place multi-year sets of enabling platforms. The CPUC's financing assessment report will form a cornerstone for how capital investment can be mobilized to support eventual AB 758 implementation.
- **ZNE Definition.** In 2011, ZNE commercial "champions" convened to discuss and seek consensus on an updated ZNE definition that the CPUC, CEC and other building sector stakeholders all might utilize. The intent is to clarify ambiguities and suggest ways to recast ZNE goals in terms that are easy to understand and market to the building and property industries, while preserving ZNE policy principles and technical considerations.
- **Coordinate across benchmarking initiatives.** To gain maximum uptake across building ownership and management circles that are national and global in nature, California's commercial building benchmarking efforts²⁸ should coordinate with other related initiatives—including American Society for Testing Materials (ASTM),²⁹ Leadership in Energy and Environmental Design (LEED),³⁰ ASHRAE,³¹ International Green

²⁶ PG&E Energy Efficiency Annual Report (May 2011) available at <http://eega.cpuc.ca.gov/AnnualReports2010.aspx>

²⁷ <http://www.savingsbydesign.com/book/savings-design-online-program-handbook#booknode-435>

²⁸ Specifically, AB 1103 (Saldana, 2007), which requires benchmarking of all commercial buildings upon sale, and D.09-09-047 (as modified by D.11-04-055), which requires the IOUs to meet benchmarking targets in their commercial energy efficiency programs.

²⁹ www.astm.org/SNEWS/MA_2010/basettefficiency_ma10.html

³⁰ www.usgbc.org/DisplayPage.aspx?CMSPageID=222.

³¹ www.buildingeq.com/

Construction Code (IGCC)³² to align common elements for widespread and easier implementation.

- **Plug Loads.** Like the residential sector, more effort is needed to reduce plug-load demand in commercial buildings. Plug loads are largely unregulated and account for the fastest growing portion of building energy used. While initial efforts are being piloted,³³ California should conduct additional research on technologies and behavioral aspects of plug load management.

³² www.iccsafe.org/cs/IGCC/Pages/default.aspx

³³ Examples include a 2008 field monitoring study by Ecos Consulting and RLW Analytics which found that plug loads consumed up to 30 percent of total office electricity. Also, the IOUs' Office of the Future program, a utility consortium, has developed a comprehensive protocol to set up controls and monitor lighting and plug loads in offices in California (and East Coast utilities). One of seven pilot studies has been completed with California pilots currently in progress.

4 Industrial

Overview

The industrial sector provides great opportunity for achieving energy efficiency savings and other benefits such as greenhouse gas (GHG) reductions through resource management. Playing major roles in both driving California's economy and consuming energy, industrial users account for 16 percent of electricity use, 22 percent of energy use (33 percent of natural gas use alone) and 20 percent of end-use CO₂ emissions in the state.³⁴ One goal of the Strategic Plan is to reduce energy intensity (energy use per gross dollar of production value) across the industrial sector by at least 25 percent by 2020.

Focusing on integration with other water, air quality, and GHG resource management strategies (Goal 1), a certification program for continuous improvement in energy management (Goal 2) and a single clearinghouse for technical and public policy guidance and workforce training (Goal 3), the Strategic Plan is designed to affect the way factories and other industrial operators perform. Key partnerships with state and federal agencies will ensure California's continued leadership in promoting energy efficiency and reducing GHGs in the industrial sector. IOU engagement in programs such as Superior Energy Performance (SEP);³⁵ Economy, Energy and Environment (E3);³⁶ and Continuous Energy Improvement (CEI)³⁷ supports market transformation in practice by focusing industrial customers on energy management as a core business component.

Energy Division anticipates launching the Industrial Action Plan in the second half of 2011. This should help to further accelerate Strategic Plan progress for the industrial sector. As a whole, to succeed with the goals of the Strategic Plan for this sector, California needs to change the focus from equipment upgrades to a holistic energy management approach.

Select Progress Highlights

- **International Management Standard for Energy (ISO 50001).** Designed to provide a tool for facilities, utilities, corporations and energy service companies, International Standards Organization (ISO) 50001 builds on existing international standards by requiring the development and management of quantitative performance measures. Currently California IOUs are participating in a demonstration pilot with U.S. DOE that promotes compliance with ISO 50001, which relates directly to Goal 1 and Goal 2 in the Strategic Plan.
- **Superior Energy Performance (SEP).** In partnership with the U.S. DOE, the IOUs are piloting this American National Standards Institute-accredited plant certification program targeted to reducing plant energy use and costs by 5 to 15 percent over three years. Testing four industrial sectors (chemicals, food processing, insulation and semiconductors), this program will provide helpful case studies for future California projects. This initiative supports Goals 1 and 2.
- **Economy, Energy and Environment (E3) Initiative.** This program coordinates federal and local technical assistance to promote sustainable business practices, provides manufacturers with customized assessments of production processes and aids with the

³⁴ CPUC 2011, Strategic Plan, p. 38.

³⁵ For more information on Superior Energy Performance, visit <http://www.superiorenergyperformance.net>.

³⁶ For more information on E3: Economy, Energy, and Environment, visit <http://www.e3.gov>.

³⁷ "Continuous Energy Improvement," Pacific Gas & Electric Company, last accessed June 15, 2011, <http://www.cee1.org/cee/mtg/01-10mtg/files/EMRonger eCheng.pdf>

implementation of energy-saving projects.³⁸ E3 enables coordination of federal and local environmental and resource objectives, and can play an important role in achieving Goal 3. The California IOUs held a kickoff meeting for this program in June 2011. The procedure for enrolling industrial customers in the E3 Program is being developed and should be rolled out later this year.

- **AB 32 Energy Audit and Reporting Requirements.** The California Air Resources Board has adopted energy audit and reporting requirements for certain industrial facilities, pursuant to AB 32.³⁹ The regulations require energy efficiency assessments of California's large industrial facilities to determine the potential for GHG reductions and other pollution reduction co-benefits through improving energy efficiency and other measures. About 50 large facilities are expected to meet the applicability threshold.
- **Save Energy Now (SEN) Leaders Program.** Developed by the U.S. DOE Industrial Technologies Program, SEN is a national initiative to reduce industrial energy intensity by 25 percent in ten years (consistent with the Strategic Plan). Over 100 companies have taken the SEN leader pledge, with champion leader plants already reaching 15 percent reductions in energy use. The SEN Leaders Program is offered to very large corporations; CalPortland, a cement manufacturer, is one participant in California, and many of the participants are national corporations with a presence in California.

IOU Programs to Advance the Plan

The IOUs' Statewide Industrial Program consists of four sub-programs.⁴⁰ Each one promotes the Strategic Plan goals by including codes and standards for appropriate technologies and products, WE&T efforts to implement products and practices, and program-specific marketing and outreach to increase customer engagement. In addition, the IOUs are offering an innovative program geared toward resource management.

- **Continuous Energy Improvement (CEI).** The CEI program provides a toolkit for planning and resource management, such as analysis, benchmarking, energy management certification, goal setting, performance monitoring, and project implementation support. Launched in September 2010, the IOUs have identified industrial customers, with some currently moving forward on the development of long-term energy plans and implementing those plans. In collaboration with the U.S. DOE and Lawrence Berkeley National Lab (LBNL), the CEI statewide team is currently overseeing several SEP demonstration projects in California. These demonstration projects will result in ISO 50001 and SEP certifications for the demo participants. In addition, the IOUs have been actively recruiting the SEN Leaders program participants into CEI.

Priorities for the Future

- **Make the case for energy management as essential to profitable business practice.** Transforming the industrial sector will mean including efficiency as a top-line business item in companies across the state. Working with groups like the International Facility Management Association (IFMA), which certifies professional facility managers, conducts research, and provides educational programs, as well as engaging CEOs and CFOs will be essential to prioritizing efficient energy use in business.
- **Engage market partners and trade associations.** Collaborating with trade associations and industrial firms to implement energy efficiency projects is helpful in increasing

³⁸ A pilot project in Texas resulted in \$85,000 in potential energy savings, reduced annual electric consumption of 159,000 kWh and reduced annual natural gas usage of 36,000 CCF.

³⁹ See Cal. Code Regs. §§ 96500-95612. Rulemaking documents available at www.arb.ca.gov/regact/2010/energyeff10/energyeff10.htm.

⁴⁰ Non-residential Audits, Deemed Incentives, Calculated Incentives, and Continuous Energy Improvement.

participation in a specific industry. For example, the Northwest Energy Efficiency Alliance (NEEA) has developed CEI projects in the Pacific Northwest using this approach and has documented market penetration success in the food industry with 36 percent of their target market participating in CEI in 2009 compared to 13 percent in 2004.

5 Agricultural

Overview

The agricultural sector accounts for approximately seven percent of California's overall energy use, with irrigation, process heat applications and refrigeration consuming most of the electric energy within agriculture.⁴¹ The Strategic Plan targets efficiency improvements in those key subsectors, as well as demand response and renewable energy production. The Plan also targets reducing production energy intensity by 15 percent from 2008 levels by 2020 for non-renewable energy.

Factors that affect the success of energy efficiency in the agricultural sector include lack of up-to-date, statewide, segment-specific data on energy consumption and the potential for energy efficiency (and renewable generation). Consequently, in developing the Strategic Plan, stakeholders identified as the single highest priority the completion of baseline studies. These studies are needed to (1) understand the energy usage patterns in California's agricultural sector, (2) forecast likely changes in the future, (3) determine the energy efficiency potential in the seven economic sub-sectors,⁴² and (4) evaluate the cost-effectiveness of measures and programs and best practices.

Without this basic information, it is impossible to design a cohesive strategy to pursue all cost-effective energy efficiency in the California agricultural sector. As such, the IOUs, with Energy Division participation, have initiated this study to better understand these market dynamics and pave the path to achieving resource management goals. Because this study has yet to be completed, very little (if any) progress has been made on Strategic Plan milestones. The final market characterization study is due February 2012.

Select Progress Highlights

The market characterization study was initiated in June 2011.

IOU Programs to Advance the Plan

- **Market Characterization Study.** The joint IOU agricultural market characterization study will include a customer needs assessment, characterization of energy use, and a baseline study of end-use technologies and equipment. It will also assess economic and achievable energy savings potentials, including waste stream opportunities.

Priorities for the Future

- **Create a knowledge base.** The market characterization study results ideally will be leveraged to create a "knowledge base" from which agricultural professionals and operators can obtain helpful information to inform individual strategies. This should spawn new technologies and applications that can help achieve multiple resource management goals.
- **Outreach and Education.** To transform agricultural energy efficiency, California will ultimately need to support development of a comprehensive, long-term marketing, education and outreach program for both the agricultural sector broadly and individual facilities and energy consumers. This outreach should include not just technologies and measures to reduce energy use, but also operational behavior and farming practices.

⁴¹ CPUC 2011, Strategic Plan, p. 46.

⁴² Those sub-sectors are irrigated agriculture; dairies; refrigerated warehouses; vineyards and wineries; greenhouses and nurseries; post-harvest processing (on and near-farm); and confined animal feeding operations (feedlots).

- **Water Savings.** Irrigation accounts for the predominant share of electricity usage in the agricultural sector. Future activities should address energy savings and environmental benefits resulting from reduction in water consumption, including strategies dealing with onsite source-water reduction, retro-commissioning, advanced irrigation systems and pressure reduction in irrigation.

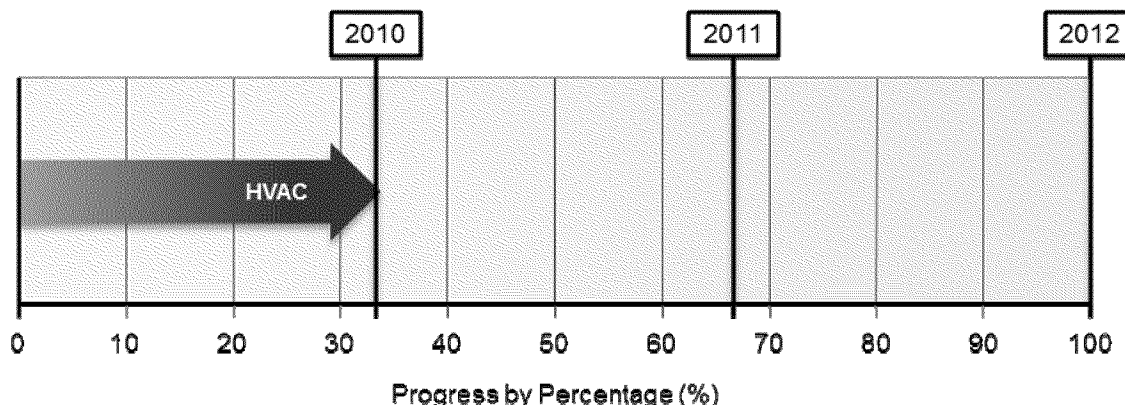
6 Heating Ventilation and Air Conditioning (HVAC)

Overview

The HVAC industry is a key target for major restructuring in order to capture the substantial opportunity for untapped energy efficiency gains. Heating and cooling buildings is one of the largest electricity end uses in the state and is also the single largest contributor to peak power demand, comprising up to 30 percent of total demand in the hot summer months.⁴³ As one of the Big Bold Energy Efficiency Strategies (BBEES), the goal for HVAC is by 2020 to transform the industry to abandon the lowest-first-cost drivers now rampant in the industry, and instead to optimize HVAC energy and economic performance specific to California's climate.

By focusing on building code compliance (Goal 1), installation and maintenance (Goal 2), whole-building design (Goal 3), and new technologies and diagnostics (Goal 4), the Strategic Plan aims to drive change in the HVAC industry. Prior to the current IOU program cycle (the first significantly influenced by the Plan), IOU programs were limited and placed few upfront demands on contractors to hire skilled workers, perform work to quality specifications, or obtain required building permits. Utility quality installation (QI) and quality maintenance (QM) programs are now underway. In addition, several other efforts across the state—including the ZNE Action Plan for Commercial Buildings, Energy Upgrade California (a building retrofit program), and efforts to build consensus on federal standards among industry groups—are making progress on key Strategic Plan elements and supporting the goals of transforming the HVAC market.

Progress Indicators



Source: HVAC Action Plan, June 2011.

Currently at 34 percent complete for the 2010-2012 period, the HVAC Action Plan is slightly behind target milestones (50 percent would be on target). Still, significant progress is expected in the second half of 2011 that promises to get HVAC back on track. These advances will be (and have been) due in no small part to the Western HVAC Performance Alliance (WHPA).⁴⁴ Originally established in D.07-10-032 as an industry advisory group to the IOUs, the WHPA has grown into

⁴³ CPUC 2011, Strategic Plan, p. 58.

⁴⁴ For more information on WHPA, please see www.performancealliance.org

an essential partner in the action plan, driving private and public sector cooperation towards achieving the Plan's goals.

Select Progress Highlights

- **HVAC Action Plan.** With stakeholders, the Energy Division launched the action plan for HVAC in June 2011.
- **New Permit Forms.** In partnership with CEC staff and the WHPA, several distinct building permit forms were combined and simplified for the majority of HVAC unit installations and ducting. The residential form was reduced by 80 percent (from 5 pages to 1), saving approximately 40 percent in administrative hours.⁴⁵
- **Online Permitting Pilot.** In partnership with the WHPA, the California Association of Local Building Officials (CALBO) is tracking a pilot program for online permitting systems to include the cities of El Centro, Oakley, Antioch, Big Bear, Napa, Plumas, Vacaville and Fairfield. This pilot aims to demonstrate cost-saving reforms to streamline permitting processes and encourage higher rates of permitted installations.
- **National Consensus Agreement on Federal Standards.**⁴⁶ Finalized in 2009, this agreement between manufacturers and leading energy efficiency advocacy organizations creates opportunities for the development of climate zone-optimized HVAC products. The new federal standards come into effect in 2016. This initiative is expected to encourage manufacturers to develop HVAC products targeted to California's hot, dry climate as called for in the Strategic Plan.

IOU Programs to Advance the Plan

- **Commercial and Residential Quality Maintenance (QM) Program.** In May 2011, the IOUs announced plans to launch newly designed QM programs that emphasize maintaining high-performing energy efficiency for HVAC in commercial (summer 2011) and residential (September 2011) buildings. Inspired by the Strategic Plan, the new program is built around industry standards⁴⁷ and supports market transformation principles. The new program design has been well-received by the HVAC industry.⁴⁸
- **Permit Requirements for IOU Incentives.** With the 2010-2012 program cycle, California's IOUs have worked to encourage greater building permit compliance by requiring customers to have used a licensed contractor and followed applicable local permitting requirements for an HVAC installation to receive incentives under Quality Installation programs. The IOUs have extended similar requirements to other HVAC programs as well.
- **QI/QM Training Programs.** In the IOUs' 2010-2012 portfolios, contractor certification is now required to qualify for rebate and incentive programs. A partnership between SCE, SDG&E and the Institute of Heating & Air Conditioning Industries (IHACI), resulted in 15,000 technical trainees in 2010.
- **HVAC Technology System Diagnostic Advocacy Program (HTSDA).** Through the HTSDA program, the California IOUs are working to provide a comprehensive approach to the numerous challenges involved in transforming the HVAC equipment market. A

⁴⁵ Bob Weismann, telephone interview, September 15, 2010.

⁴⁶ "American Council for an Energy Efficient Economy Fact Sheet on Furnace, Air Conditioner, and Heat Pump Efficiency Standards Agreement," ACEEE, last accessed May 24, 2011, http://www.aceee.org/files/pdf/1009hvac_fact.pdf

⁴⁷ ASHRAE/ACC/ANSI standard 180 for commercial, and ACCA Standard 4 for residential.

⁴⁸ See June 2011 article in Indoor Comfort News, a leading HVAC trade publication: "Contractors Say 'Yes' to California Utilities HVAC QM Programs."

WHPA committee was formed to work on equipment failure diagnostics and sensor-related issues, including placement and quality.

Priorities for the Future

- **Develop a statewide online permitting system.** In addition to establishing consistency throughout all climate zones in the state, an online system promises to be a low-cost way to ensure the greatest permit use. Currently, the CEC and local building departments have regulatory and budgetary / resource constraints that limit their ability to establish such a statewide system. These limits could be addressed in the future.
- **Simple and enforceable standards.** If it is possible for HVAC standards to become less complex (even if more stringent), the hope is compliance and enforcement will increase. Ideally, standards are most enforceable when simple to assess (i.e., amenable to the “eyeball test”) and they align with the limited field time that building officials have.
- **Create a credible threat for noncompliance.** Today, compliance is left to overburdened and underfunded local government building officials. As a result, HVAC permit non-compliance rates are estimated as high as 95 percent in the residential retrofit market. There is some evidence that increased HVAC code compliance increases energy savings.⁴⁹ Stronger code enforcement and the threat of penalties are needed to create effective disincentives to circumvent the law and miss out on expected energy and operating costs savings.

⁴⁹ Swan, Eric and Jarred Metoyer, RLW Analytics. Wim Bos, Sacramento Municipal Utility District. “Too Much Stick? Not Enough Carrot? Testing the Presumption of Non-Compliance.” 2008 ACEEE Summer Study on Energy Efficiency in Buildings. Available at http://www.aceee.org/sites/default/files/publications/proceedings/SS08_Panel1_Paper22.pdf

7 Codes and Standards (C&S)

Overview

The Strategic Plan recognizes Codes and Standards (C&S) as one of the policy tools that is critical to implementing the market transformation goals of the Plan. As stated in the Plan, the vision is “a broad range of aggressive and continually improving minimum and higher voluntary sets of energy codes and standards will be adopted to greatly accelerate the widespread deployment of zero-net energy and highly efficient buildings and equipment. The effectiveness of codes and standards will be enhanced by improved code compliance as well as coordinated voluntary activities.”⁵⁰ The Plan aims to achieve this vision by continually strengthening and expanding building and appliances codes and standard (Goal 1), and dramatically improving code compliance and enforcement (Goal 2).

There are only a limited number of Title 20 (T20) appliance standards and Title 24 (T24) building code update cycles in California prior to the Plan’s 2020 and 2030 goals. The current code update has been delayed a year, and will take effect in 2014 instead of 2013 – leaving effectively one additional code update to achieve the first set of Plan goals in 2020. The complexity of adopting advanced codes and standards emphasizes the importance of “reach codes”⁵¹ and voluntary efforts to become central to the C&S component of the Plan, alongside outreach to and coordination with local governments.

Select Progress Highlights

- **Battery Charger Standards.** Effective 2012, the CEC will have adopted changes to battery chargers to make them 40 percent more efficient. Potential cost-effective energy savings is estimated at 2,100 GWh/yr.⁵²
- **Reach Codes.** Several cities and counties have adopted reach codes that are more stringent than the statewide T24 minimum code and can be adopted through local ordinances.⁵³ These local ordinances are providing lessons and best practices as the state moves toward more progressive codes.
- **Local Building Officials Training Workshops.** With the Institute of Heating and Air Conditioning Industries (IHACI), Sheet Metal and Air-Conditioning Contractors’ National Association (SMACNA) and Home Energy Rating System (HERS) raters, California’s IOUs are offering training to alert contractors to T24 code changes. Through these events, industry partners are sharing revised permit forms and helping to establish a credible threat for contractors working without permits or licenses.
- **National Consensus Agreement.**⁵⁴ With federal preemption⁵⁵ cited as a roadblock in many efforts to advance codes and standards aggressive enough to realize the goals of

⁵⁰ CPUC 2011, Strategic Plan, p. 62.

⁵¹ Based on Decision 10-10-049; CPUC defines Reach Codes as codes that must be adopted formally by an enforcement jurisdiction. The code must be legally enforceable and enforced by the jurisdiction, and it must apply to all entities within the adopting jurisdiction.

⁵² CEC, March 3, 2011 Staff Workshop on Battery Chargers and Lighting Controls:
http://www.energy.ca.gov/appliances/battery_chargers/documents/2011-03-03_workshop/presentations/Appliance_Efficiency_Regulations.pdf

⁵³ Cities that have adopted reach codes include: Redwood City, Los Altos, Marin, San Rafael, Union City, Morgan Hill, Richmond, Palo Alto, Chula Vista, Santa Clara, San Jose, Sonoma, Hayward, and San Francisco.

⁵⁴ “American Council for an Energy Efficient Economy Fact Sheet on Furnace, Air Conditioner, and Heat Pump Efficiency Standards Agreement,” ACEEE, last accessed May 24, 2011, http://www.aceee.org/files/pdf/1009hvac_fact.pdf

the Strategic Plan, this agreement is a case study for success. The agreement (finalized in 2009) creates opportunities for the development of climate zone-optimized HVAC products. The new standards come into effect in 2016 and will be “locked” into place from 2016-2022.

IOU Programs to Advance the Plan

The IOUs’ statewide Codes and Standards Program is comprised of the following main sub-programs:

- **Building Codes and Appliance Standards Advocacy.** This program provides Title 24 and Title 20 advocacy efforts and the development of Codes and Standards Enhancement (CASE) studies⁵⁶ to influence standards and code-setting bodies to strengthen energy efficiency regulations, by improving compliance with existing codes and standards, and by working with local governments to develop ordinances that exceed statewide minimum requirements.
- **Compliance Enhancement Program (CEP).** New in 2010, this program supports building departments that seek general improvement to code compliance, operations and processes. The program provides training for code officials and modified tools to improve compliance process such as the development of electronic forms, tracking software, online permitting etc. The program is also working with California Building Officials (CALBO), CEC, and local government partners to encourage other jurisdictions to adopt successful practices and tools identified during an initial pilot phase.
- **Reach codes.** Also new in 2010, this program supports individual local governments to adopt more aggressive efficiency codes for their jurisdictions that go beyond Title 24.

Priorities for the Future

- **Compliance Studies.** Critical to the success of the Strategic Plan goals is the establishment of compliance rates for the various market sectors. Compliance rates will inform future policy or implementation activities to overcome barriers to market adoption of energy efficiency standards.
- **Improve Market Intelligence, Outreach and Education .** Currently compliance is left to overburdened and underfunded local government officials. Outreach to consumers and key stakeholders is essential to ensure compliance with C&S. Education and training programs inform stakeholders of the benefits of compliance and the performance downsides of noncompliance.
- **Develop C&S Action Plan.** Working with the CEC and other stakeholders, an action plan is needed for the C&S chapter of the Plan.
- **Outcome-Based Codes.** Outcome-based codes are a new energy code concept focusing on how buildings (both new and existing) can perform based on actual post-construction performance outcomes, rather than the features of installed equipment and components. Outcome-based codes and accompanying policies would establish an energy performance target for each building and measure its performance after

⁵⁵ Federal law pre-empts states from adopting more stringent standards for certain appliance and equipment, including general service lighting, space heating and water heating, refrigerators and freezers, and other end uses, which collectively account for two-thirds of all statewide electrical appliance end-use and 99% of all gas appliance use. States may seek waivers from pre-emption, but this option has rarely been attempted and federal authorities have yet to approve such a request.

⁵⁶ CASE studies are focused on energy efficiency improvements, are developed for promising design practices and technologies and presented to standards- and code-setting bodies such as the CEC. Advocacy also includes affirmative expert testimony at public workshops and hearings, participation in stakeholder meetings, ongoing communications with industry, and a variety of other support activities.

occupancy to assure expectations are being met.⁵⁷ Stricter enforcement of prescriptive codes in existing buildings could potentially discourage energy efficiency investment and renovation. These codes can be used to support innovative approaches to energy efficiency in existing buildings.

⁵⁷ For more information, go to www.newbuildings.org/pathway-outcome-based-codes-first-step

8 Integrated Demand-Side Management (IDSM)

Overview

Integrated demand-side management (IDSM) leverages energy efficiency, energy conservation, demand response, advanced metering, and distributed generation to reduce energy usage and GHG emissions. IDSM aims to advance policies and projects in research and development, commercialization, deployment, and codes and standards that support integrated solutions.

The Strategic Plan promotes integrated approaches by focusing on marketing of opportunities across all customer classes (Milestone 1), program delivery pilots (Milestone 2), program offerings across multiple resources (Milestone 3), and development and support of new technologies (Milestone 4). This IOU program cycle serves as a trial period for many of the IDSM programs, particularly the pilot projects. Consequently, evaluation is critical for assessing lessons learned and planning the next program cycle to implement the best policies and projects.

While all four IOUs have begun to make progress on IDSM goals as directed by the Plan, there are still areas that require more progress such as initiation of integrated pilot programs and projects which will be used to drive development of best practices and lessons learned for the next cycle's program planning. Marketing (Milestone 1) and emerging technologies (Milestone 4) areas have shown some progress but emphasis still needs to be directed toward promoting the "integration message" and identifying examples that more fully integrate all demand-side technologies (energy efficiency, distributed generation, demand response). Regular IDSM Task Force meetings and quarterly IOU meetings provide opportunities to report on progress, discuss obstacles, and share best practices to integration. However, coordinating among multiple players, often in different sectors, and overcoming competing priorities by developing shared objectives, identifying opportunities to share implementation costs from various DSM program funding streams and resolving potential conflicting proceeding directives continue to impede progress towards the goal. In particular, developing an integrated cost-effectiveness methodology remains challenging due to different adopted cost-effectiveness frameworks for distributed generation (DG), demand response (DR), and energy efficiency (EE).

Select Progress Highlights

- **IDSM Task Force.** Consisting of IOU representatives and Energy Division staff, this team drives progress on eight action items directly related to implementing the Strategic Plan. Items address include (1) cost-effectiveness, (2) measurement and evaluation, (3) emerging technologies, (4) integrated audit tools, (5) pilot programs, (6) marketing, (7) internal IOU staff integration, and (8) reporting requirements.
- **Reorganization at the IOUs and Energy Division .** The IOUs (most notably PG&E) and the CPUC's Energy Division have internally reorganized to help promote integrated demand-side strategies. In addition, PG&E hosts annual IDSM training forums for their program and sales force promoting the concepts of demand-side integration and strategies.
- **Cost-effectiveness White Paper.** In March 2011, the IOUs held a workshop to discuss a white paper on IDSM cost-effectiveness. The paper recognizes the challenging and highly controversial nature of implementing cost-effectiveness metrics and recommends leveraging different approaches to achieving cost-effectiveness in pilot programs. The statewide IDSM Task Force is currently considering different options to further examine and test the findings of the cost-effectiveness white paper.

IOU Programs to Advance the Plan

- **Statewide Integrated Audit Tool.** Targeting a release date of January 2012, the IOUs have selected developers for a new customer-based online tool for small business and residences. The tool will present customized energy management plans and display metrics (e.g., savings, costs and benefits, and payback period) for integrated solutions including EE, DR and DG.
- **Integrated pilot programs.** To develop best practices and lessons learned, the IOUs are tracking integrated pilot programs, including: PG&E's Green Communities program (\$21M); SCE's Sustainable Communities program (\$8.6M); and PG&E's Innovator Pilots program (\$4.3M); and others.

Priorities for the Future

- **Distributed Generation Funding for Integrated Activities.** Specific funding for integrated program activities is currently authorized through the energy efficiency and demand response proceedings, but not distributed generation. Currently there is separate market facilitation and development funding for administration of the CSI solar PV and SGIP distributed generation programs. The IOUs are expected to propose an approach and funding level in the DG proceeding to support integration of DG outreach and advice alongside EE and DR.
- **Integrated Audit Tool Functionality, Availability, and Consistency.** PG&E and SCE each selected vendors and solutions to offer an integrated audit tool for residential and small commercial. These separate development efforts should be coordinated in order to promote seamless customer delivery and a statewide perspective. Emphasis for the online tool as well as onsite audits for large commercial and industrial customers should be on integration of all demand-side customer solutions (EE, DG and DR) and education of customers as to the costs and benefits of pursuing whole building integrated improvements. Existing tools do not have these capabilities.
- **Data collection and tracking.** Successfully acquiring and evaluating savings and cost information for integrated projects is critical to identify progress and lessons learned for the next program cycle. Successes, challenges, and recommended improvements for collecting this information should be evaluated as part of the current program cycle evaluation.

9 Workforce, Education and Training (WE&T)

Overview

As noted in the Strategic Plan, “in order to accommodate the dramatic increase in energy efficiency activities envisioned by this Plan and required by AB 32, California must develop a trained workforce, including people qualified in energy-efficiency engineering, construction, maintenance, program design and implementation, and financial analysis.”⁵⁸ California cannot realize all economic energy efficiency and demand-side management potential without a properly trained workforce (often referred to as “green collar jobs”). The Plan envisions that by 2020 minority, low income and disadvantaged communities fully participate in training and education programs at all levels of the demand-side management (DSM) industry.

While it is not the mission of the IOUs or the CPUC to create a comprehensive statewide workforce education and training (WE&T) program in all of California’s economic sectors, the CPUC and the IOUs have taken steps to strengthen existing and, where needed, promote new coordinated workforce training efforts specific to energy-related sectors. In coordination and partnership with other entities pursuing similar objectives, these workforce training efforts will support the achievement of ZNE goals and other Strategic Plan goals.

WE&T is on track to meet its goals. The ability to stay on track will hinge upon timely and effective implementation of key recommendations of the WE&T Needs Assessment ordered in D.09-09-047.⁵⁹ Recommendations from that study include utilizing Sector Strategies to form partnerships that advance job placement, working with key agencies on training curricula, and developing efforts focused on low income and hard-to-reach populations.

Select Progress Highlights

- **Clean Energy Workforce Training Program (CEWTP)**. Launched in late 2009, this program is funded by the American Recovery and Reinvestment Act (ARRA) and administered by the CEC. CEWTP helps prepare workers for careers in energy efficiency, water efficiency, renewable energy, and clean transportation. Over 48 grants have been awarded throughout California.⁶⁰
- **California Workforce Education and Training Needs Assessment.**⁶¹ Developed by the Don Vial Center on Employment in the Green Economy at UC Berkeley and funded by IOU ratepayers, the Needs Assessment calls for more stringent contractor licensing, increased training, and a focus on stable firms to help realize the Plan’s goals. The IOUs have submitted plans to change their WE&T programs in response to the Needs Assessment.
- **The California Advanced Lighting Controls Training Program (CALCTP).**⁶² This program is uniquely focused on increasing the use of lighting controls—a crucial best practice that will contribute to meeting the Strategic Plan’s lighting goals. CALCTP is training and certifying electricians in the proper design, installation and commissioning of advanced lighting control systems and is considered a model, per the Needs

⁵⁸ CPUC, Sept. 2008, p. 70.

⁵⁹ CPUC Decision available at <http://docs.cpuc.ca.gov/Published/Graphics/107829.pdf>

⁶⁰ CEWTP, last accessed June 9, 2011, <http://www.energy.ca.gov/cleanenergyjobs/>

⁶¹ Donald Vial Center on Employment in the Green Economy, March 17, 2011, p. xxv.

⁶² “California Advanced Lighting Controls Training Program,” accessed January 17, 2011, <http://www.calctp.org/>

Assessment, for utilizing sector strategies to advance workforce training objectives via a coordinated, leveraged, multi-market actor approach .

IOU Programs to Advance the Plan

- **IOU Centergies Program** . This program is organized around market sectors and facilitates education and training in energy efficiency, IDSM and resource management utilizing a network of utility-funded energy centers throughout the state.
- **IOU Connections Program** . This program is focused on building relationships and promoting coordinated training activities with the educational sector as well as entry- and introductory-level community-based training efforts and new emerging green careers.

Priorities for the Future

- **Focus on Skilled Labor for Residential.** As noted in the Needs Assessment, the residential energy efficiency workforce includes a higher concentration of poor quality installations due to lack of clear training and installation standards which results in low paying jobs. The WE&T effort must strive to promote the same quality of installations found in the commercial sector as well as in the residential sector, via home retrofits, solar installations, and new home construction.
- **Deepen Partnerships with the Private Sector.** The Strategic Plan states, “An effective, comprehensive WE&T program for a new energy efficient economy requires collaborative efforts by many entities. It is not the core mission of the IOUs to effectuate the level of change needed to create a comprehensive WE&T program, nor can ratepayers fully fund this effort.”⁶³ Ratepayer dollars must be leveraged through more training partnerships with the private sector, K-12 schools, and advanced educational institutions to create the workforce the Strategic Plan demands.
- **Foster Linkage Between Training and Placement.** Leveraging relationships with the California Workforce Investment Boards and other public and private organizations may help fill the void of placement opportunities suffered in the recession. The Needs Assessment found that much of the ARRA dollars dedicated to funding training efforts with no clear linkage to effectuating increased market demand and corresponding job placement. The linkages between market demand, workforce training, and job placement need to be strengthened in order to achieve the goals of the Plan.

⁶³ CPUC, Sept. 2008, pp. 70-71.

10 Marketing, Education & Outreach (ME&O)

Overview

In nearly every chapter of the Strategic Plan, the importance of marketing, education and outreach (ME&O) is emphasized. To be sure, effective ME&O is required for wide-scale adoption of energy efficiency and market transformation identified in the Plan. While describing a vision where Californians are “engaged as partners in the state’s energy efficiency, demand-side management and clean energy efforts by becoming fully informed of the importance of energy efficiency and their opportunities to act,”⁶⁴ the Plan outlines a variety of goals and strategies that are best summarized as a focused effort to change awareness into action.

In 2010, several steps were taken to lay the foundation for this program. A statewide marketing and communications plan was completed. A statewide web portal, engage360.com, was launched in October 2010. To date the focus of the campaign has been on increasing awareness and knowledge about opportunities for Californians to become more energy efficient through social media and a grassroots campaign.

It is too soon to tell if the new approach (grassroots outreach followed by a mass media campaign) will result in greater adoption and demand for energy efficiency products and services. The IOUs will need to gather early feedback and monitor results closely to ensure that customer’s awareness, knowledge and attitudes about the program and the actions they can take to manage energy use are meeting performance expectations.

Select Progress Highlights

- **Ethnographic Research.** Completed in 2009, this study provided key insights as to how to increase awareness, knowledge and attitudes about energy use among distinct ethnographic groups. This provided foundational research on what motivates people to maximize energy efficiency and conservation.
- **Market Segmentation Research.** Building from the ethnographic research, this study identified five unique segments of the California consumer population. Marketing strategies were later designed to target select groups, based on an understanding of their views, motivations and behaviors in relation to energy use.

IOU Programs to Advance the Plan

- **Statewide ME&O program.** Launched in October 2010, the new statewide clean energy program and its accompanying website (www.engage360.com) were designed and launched to inspire consumers to change their behavior and affect meaningful, long-term reduction in their energy consumption.
- **Community-based social media campaign.** A campaign is underway to engage people and make them aware of the statewide ME&O program and simple actions they can take. Initially, the campaign is targeting leaders, who then use social networks to spread the word about the campaign.
- **Energy Savings Assistance Program (ESAP).** Also launched in October 2010, ESAP is the new brand for low-income energy efficiency programs. ESAP provides no-cost energy saving home improvements to qualified limited-income renters and homeowners.

Priorities for the Future

⁶⁴ CPUC, Sept. 2008, p. 75.

- **Bridge Gap to Larger End-Use Sectors.** The statewide ME&O program is initially focused on the mass market, which is mostly residential. Given the massive amount of energy savings that California needs to secure, it is vital that any branding take heed of the different needs of consumers and non-residential energy user segments. The Strategic Plan calls for a focus on partnerships with business leaders, but this currently is not being emphasized by the statewide ME&O campaign. More focused attention must be paid to the communications approach to the non-residential markets.
- **Closely Evaluate Statewide ME&O Campaign Results.** The initial messaging of the statewide ME&O grassroots campaign is focused on increasing the number of “no-cost / low-cost” actions people can take to save energy. The IOUs should quickly evaluate how this approach is working and make adjustments as necessary to ensure the program continues in alignment with the broader vision set forth in the Strategic Plan to achieve comprehensive and long-lasting efficiency outcomes.
- **Establish a Clear Statewide Umbrella Brand.** The statewide ME&O program and web portal were originally intended to provide customers with an integrated experience and increased understanding of the full array of energy efficiency and demand side options available to them. At the same time under federal stimulus funding, the Energy Upgrade California home energy retrofit implementation program was launched. Going forward attention must be paid to how to distinguish or integrate the two efforts, and coordinate with all the other efficiency programs and services offered by utilities, manufacturers, contractors, businesses and local governments so that California energy users have clear and easy access to essential information about their efficiency options.

11 Research & Technology (R&T)

Overview

The advancement of technology related to energy use and demand is essential to achieving the goals of the Strategic Plan. The Plan's vision is for technology advancement to "match-or even eclipse-the consumer electronics industry in innovation, time to market, and consumer acceptance."⁶⁵ To achieve this, the Plan identifies a need to create demand pull and set the research agenda to pursue both incremental and game-changing energy efficiency technology innovations (Goal 1); and conduct targeted emerging technologies R&D to support the BBEES and integrated energy solutions goals (Goal 2).

Current R&D activities in energy efficiency technologies are being led by some of the most influential programs and institutions in the nation, such as the CEC Public Interest Energy Research (PIER), UC Davis, and Lawrence Berkeley National Labs (LBNL) to name a few. However, to achieve the ambitious goals of the Strategic Plan, the R&T chapter of the Strategic Plan calls for more coordination between the public and private sectors' research and applying a "system approach" amongst the different entities to set the research agenda and leverage private and federally funded research and investment.

The Plan stresses the importance of the need for "profound" improvements in technology efficiencies as well as integrated building design approaches, energy management and diagnostic tools that take a "holistic" view of building design and operations. In addition, the plan articulates the importance of the launching pilots and demonstration projects on the path to wider market deployment of technologies related to the BBEES. However, the current number of existing pilot and demonstration projects do not appear likely to bear out the market transformation that is required to achieve the Strategic Plan goals. Without more focus on crossing the "valley of death" (i.e., the deep and wide gulf between proof of concept and the beginning of mass production and significant sales) and implementing long-term strategies to increase the adoption of new and/or emerging big and bold technologies and practices, it is unlikely that California will be able to realize the goals of the Strategic Plan.

Select Progress Highlights

- **Research and Technology Action Plan.** With stakeholders, the CEC PIER team and Energy Division launched a joint public workshop to develop the action plan for the Research and Technology chapter in July 2011.
- **Public Interest Energy Research (PIER).** PIER administers an approximately \$86.5 million annual budget, with 33% of the funding dedicated to EE research, 80% of which is for building efficiencies. Current highlights of ZNE related funded-research include:
- **ZNE/High Efficiency Building Demonstration Project.** In the 2011/12 fiscal year, the PIER Program plans to implement a zero net energy/high efficiency building demonstration project. The purpose is to fund transformational projects that are cost-effective and reproducible which include an integrated suite of advanced energy efficiency, renewable energy and other technologies. Demonstration projects will be done in partnership with electric/natural gas utility programs with contribution and funding commitments from multiple stakeholders.
- **Multi-family ZNE Homes.** Non-profit housing developers (Global Green USA) under contract with PIER, building two ZNE multifamily affordable housing projects in San

⁶⁵ CPUC 2011, Strategic Plan, p. 79.

Diego County.⁶⁶ These two projects exceeded 2007 Title 24 by approximately 15% and 40%, respectively. Numerous financial tools were used to keep net costs at a minimum,⁶⁷ including additional low income housing tax credits, federal solar business investment tax credits, solar and energy efficiency rebates, and conventional debt.

IOU Programs to Advance the Plan

The IOUs Emerging Technologies Program accelerates the introduction of innovative energy efficient technologies, applications, and analytical tools that are not yet widely adopted in California. Several subprograms are examples of the types of programs that will help achieve Plan goals:

- **Technology Resource Incubator Outreach (TRIO).** Launched in 2010, TRIO provides training and networking for entrepreneurs and companies offering energy saving technologies.
- **Demonstration Showcases.** These large-scale projects expose measures to various stakeholders utilizing real-world applications and installations.
- **Scaled Field Placement (SFP).** SFP installs a number of emerging technologies measures (that have already undergone an assessment) at customer sites to monitor effects, gain market traction and collect market information. Incorporating advanced technologies like high-efficiency, solid-state, light-emitting diode (LEDs) into this program have helped to bridge the “valley of death” to customer adoption.
- **Technology Development Support (TDS).** TDS targets opportunities for energy efficiency product development by taking an early-stage technology (such as an LED) or concept and transforming it into a saleable product – bridging the gap between R&D and the market. This effort process has resulted in more efficient televisions, monitors, and lighting fixtures.

Priorities for the Future

- **Build Partnerships.** While California has established collaboration between the CEC, IOUs and CPUC via the Emerging Technologies Coordinating Council (ETCC), more engagement from the state’s private and public research labs will help advance ZNE focused research. Closer coordination with the U.S DOE’s research initiative is also warranted.
- **Improve Market Intelligence and Decision Making Process.** Too often, technologies emerge in a vacuum, without adequate research on customer needs and quality assurance. Targeted research on stakeholder’s decision-making and market research will enhance market pull and customer acceptance of new measures and accelerate market adoption of new/emerging technologies and practices.
- **Improve Knowledge Systems and Feedback on Research and Development, Demonstration and Deployment (RDD&D).** To leverage the state’s research community and create a pathway for market transformation at the scale needed for the Strategic Plan, it is crucial to develop new ways to enhance information dissemination and sharing lessons learnt on studies and results amongst private and public entities. Identifying ways to institute continuous learning is one of the central innovations needed to advance the Plan.

⁶⁶ The Solara project started in Spring of 2007, and the Los Vecinos project, started in Spring of 2009.

⁶⁷ Both projects achieved these performance results with first cost less than \$5000/housing unit.

12 Local Government

Overview

The Strategic Plan outlines five goals to place local governments at the forefront of energy efficiency, including expanding adoption of reach codes (Goal 1), increasing support for code compliance (Goal 2), and "leading by example" (Goal 3). Local governments, perhaps more than state agencies, have a crucial role in transforming energy use in the state's cities and counties. Despite the economic downturn and its effect on local government revenues, many local governments have voiced very public commitments to leadership on climate change and clean energy issues. Coordination of regional efforts (e.g., joint powers authorities, councils of government) towards the goals of the Plan and the use of general plans to promote energy efficiency are just two examples of the types of leadership shown by local governments to realize the maximum energy savings.

Still, progress is needed on several strategies outlined in the Strategic Plan, including the development of a statewide technical assistance program, and an "innovation incubator" that help local governments select and advance the best efficiency technologies for their localities. The goals of the Plan were established prior to the downturn; many strategies that call for changes to budgets and staffing at local governments are either stalled or simply unrealistic at this time. For many local governments, financing is a fulcrum to achieve savings goals, and the disruption of locally-sponsored Property Assessed Clean Energy (PACE) assessment programs has dealt a major blow to the residential sector.⁶⁸ Perhaps the most important near-term focus to get the Strategic Plan "back on track" with local governments is to identify new ways to enable local financing.

Select Progress Highlights

- **Reach Codes.** As of the end of 2010, about 5 percent of California's cities/counties had adopted reach codes, representing about 10 percent of the state's population.
- **Statewide Energy Efficiency Collaborative (SEEC)** . A partnership between ICLEI,⁶⁹ the Local Government Commission (LGC), and the IOUs , SEEC provides direct assistance and tools to local governments across the state, including networking and educational assistance to build local capacity.

IOU Programs to Advance the Plan

- **SCE Energy Efficiency Local Government Strategic Plan Pilot.** This \$32M SCE program allocates funds for up to \$1 million/applicant for Strategic Plan support activities. These activities range from codes and ordinances to encourage or require building performance that exceeds state requirements adopting climate change mitigation efforts. Twenty-four local government pilots are currently under way.
- **PG&E's Innovator Pilot Program.** This program provides competitive local government grants that allow communities that are leaders in energy and GHG reduction activities to

⁶⁸ PACE programs allow property owners to finance energy efficiency and renewable energy improvements using low-interest bonds issued by local governments. Property owners opt-in to receive long term financing (up to 20 years) for these improvements, which is repaid through an assessment on their property taxes. In July 2010, the federal Housing and Finance Authority issued a statement saying PACE programs present significant risks (primarily due to lien seniority issues) and Fannie Mae and Freddie Mac stopped purchasing mortgages for properties with PACE assessments, effectively stalling PACE programs for residential.

⁶⁹ ICLEI – Local governments for Sustainability we formerly called the International Council for Local Environmental Initiatives. For more information, visit www.iclei.org/.

test creative approaches to energy efficiency. Seventeen innovator pilots are currently underway.

Priorities for the Future

- **Revisit Goal 1 (Reach Codes)**. As reach codes “reset” every time there is a change in Title 24, the 3-year cycles of Title 24 updates make widespread adoption of local reach codes difficult for many localities. Given that it takes each of the 270-536 plus cities and counties several months to review and assess reach codes, the 3-year cycle reach code guidelines should be reconsidered in concert with this goal.
- **Create compliance baseline**. Reducing non-compliance with Title 24 remains a challenge. In the 2006-2008 cycle, code compliance studies were completed for new construction and codes and standards programs, but these studies were not designed to draw conclusions at the local jurisdiction level.⁷⁰ While some sectors (such as HVAC) have had studies to show comparative compliance rates by jurisdiction, there is no data on overall compliance baseline to which to compare. A compliance baseline should be created to service all relevant sectors addressed by the Strategic Plan. The 2010-2012 evaluation, measurement and verification (EM&V) effort will attempt to produce some of these needed studies.
- **Build local capacity**. Building capacity within local governments (or regional energy offices) to address energy and climate programs for their own operations and communities is essential. Local and/or regional capacity should be developed and then maintained by its own means through appropriate mechanisms.

⁷⁰ Further, limited data was collected for non-residential buildings due to challenges obtaining baseline data from local building departments, so conclusions for the non-residential sector are not robust.

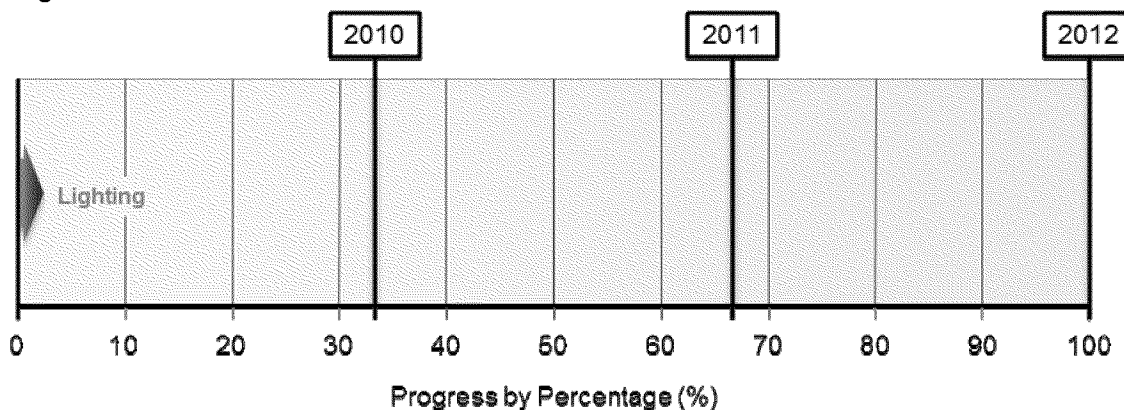
13 Lighting

Overview

Lighting represents approximately one quarter of residential and commercial electricity use in California⁷¹ and (historically) 50% of utility program portfolio savings. As such, the widespread use of energy efficient lighting is a critical element in the Strategic Plan. California's AB 1109 (Huffman, 2009) will phase-out traditional, low efficiency incandescent lamps by 2018 and help advance the Strategic Plan's goals. However, supporting strategies and implementation activities are needed to achieve the higher goal of a 60 to 80 percent reduction in lighting energy usage by 2020, as set forth in the Strategic Plan.

With the advent of the Strategic Plan, utility programs (2010-2012) have new features that support achieving ZNE goals and encourage best practices, including the High Performance Office Lighting program,⁷² the Advanced Consumer Lighting program and the Lighting Market Transformation (LMT) program.⁷³

Progress Indicator



Source: Lighting Action Plan, July 2011.

By averaging the progress of all (64) near-term milestones in the Strategic Plan, lighting is behind schedule with only approximately 3 percent of progress achieved to date. Given that the lighting chapter of the Strategic Plan was only just published at the end of 2010, it would be unrealistic to expect the same level of progress as other sectors (such as HVAC). However, now that the Lighting Action Plan has launched and champions are engaged, lighting is poised to make significant progress in the months ahead.

Select Progress Highlights

⁷¹ Lighting represents 22 percent of residential electricity use (CPUC, 2010) and 35 percent of commercial electricity use (Itron, 2006. California Commercial End-Use Survey. Prepared for the CEC. Publication # CEC-400-2006-005. March 2006).

⁷² For more information go to the California High Performance Lighting Program website: http://www.pge.com/includes/docs/pdfs/mybusiness/energysavingsrebates/incentivesbyindustry/ca_highperformance_lighting_program_fs.pdf

⁷³ For more information regarding the investor-owned utilities' 2010-2012 energy efficiency programs, see (for example) Pacific Gas & Electric Company's "Energy Efficiency Program Descriptions" at <http://www.pge.com/about/rates/rebateprogrameval/programdescriptions/>

- **Lighting Action Plan.** With stakeholders, Energy Division launched the action plan for lighting in July 2011.
- **CPUC Rulemaking 09-11-014.**⁷⁴ In R.09-11-014, several strategic plan milestones are being considered as part of the post-2012 portfolio guidance proceeding, including the appropriate length of portfolio cycles and cost-effectiveness methodologies.
- **Lighting Technology Overview (LTO).**⁷⁵ Updated in 2010, the LTO is the first consolidated source of best practice lighting solutions for multiple market sectors (including their technical potential and barriers currently facing their adoption). The LTO identified best practice lighting solutions, which confirmed the feasibility of the CPUC's 60-80% lighting energy consumption reduction goal by 2020.
- **University of California at Davis' (UC Davis') Smart Lighting Initiative.** This university effort is the first commitment to the Strategic Plans' goals from a large institution. Frequent communications about progress will help transform not only the way students and faculty at UC Davis think about lighting, but the broader population as well.

Programs to Advance the Plan

- **Lighting Market Transformation.** This program enables utilities to identify gaps in the lighting market transformation strategies for different technologies and create data-driven solutions. It develops and tests innovative program strategies to advance market transformation and helps enfold proven approaches into other lighting programs.
- **Advanced Consumer Lighting.** This program promotes the next generation of products by offering discounts to reduce the costs and strives to influence future purchasing behaviors of customers. An array of product types, models, and technologies are offered, including specialty CFLs, light emitting diodes (LED), cold cathode, and high-efficiency incandescent.

Priorities for the Future

- **Ensure advanced product quality.** While California needs advanced lighting today to prevent lost saving opportunities tomorrow, innovations cannot be rushed. To ensure that consumers install and use best practices lighting, consumers must be able to buy products that meet performance standards for light quality and other amenities which provide benefits alongside energy savings.
- **Dramatic scale-up.** Focusing government agencies on the need for reform and acknowledging policy barriers is a step in the right direction. While the Strategic Plan has influenced changes in lighting, California is still far from the scaled required to achieve the 60-80 percent reduction in lighting electrical energy use required.
- **Statewide coordination.** Achieving a 60-80 percent reduction in lighting electrical energy use will require actions related to code development, design and financial mechanisms. There is need for a broadly representative group, including a range of public and private sector volunteers, to help coordinate efforts to advance this action plan.

⁷⁴ CPUC, 2009b. Order Instituting Rulemaking to Examine the Commission's Post-2008 Energy Efficiency Policies, Programs, Evaluation, Measurement, and Verification, and Related Issues (Rulemaking 09-11-014). Filed November 20, 2009, accessed January 17, 2011, <http://docs.cpuc.ca.gov/efile/CM/125338.pdf>

⁷⁵ CLTC, 2010. 2010 Lighting Technology Overviews and Best-Practice Lighting Solutions. Prepared for the CPUC. Accessed January 17, 2011, http://uc-ciee.org/buildings/documents/2010_LTO_082010.pdf