CA | Energy Efficiency Strategic Plan

Codes and Standards Action Plan

2012-2015

Developed with Stakeholder Input

California Energy Commission Efficiency Division	California Public Utilities Commission Energy Division

Acknowledgements

This Action Plan was developed primarily through collaboration between the California Energy Commission's Efficiency Division, the California Public Utilities Commission's Energy Division staff, and the California Investor Owned Utilities' Codes and Standards Program staff and their consultants, along with valuable input from stakeholders. The names of all contributors and participants are listed in the Appendices A and B.

Disclaimer

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Action Plan Funding

The key initiatives in this Action Plan represent what stakeholders have prioritized as those that will result in direct or indirect energy savings to help achieve the state's energy policy goals. However, not all of these measures are mandated, nor do they all have the funding necessary for execution. Possible funding sources for these initiatives could come from investor-owned utility (IOU) programs, publicly owned utility (POU) programs, state and federal government programs, public-private partnerships and potential sources.

Abbreviations and Acronyms

AB	Assembly Bill (California)
ACM	Alternative Calculation Method
C&S	Codes & Standards
CABEC	California Association of Building Energy Consultants
CALBO	California Building Officials
CASE	Codes and Standards Enhancement
CEA	Certified Energy Analyst
CEPE	Certified Energy Plans Examiner
CIAG	Compliance Improvement Advisory Group
CLASP	Collaborative Labeling & Appliance Standards Program
CLTC	California Lighting Technology Center
CPUC	California Public Utilities Commission
CSE	California Simulation Engine
CSLB	Contractors State License Board
ED	Energy Division (at CPUC)
EE	Energy Efficiency
EM&V	Evaluation, Measurement, & Verification
EPA	Environmental Protection Act
ETCC	Emerging Technologies Coordinating Council
ETP	Emerging Technologies Program
GHG	Greenhouse Gas
GWh	Gigawatt hour
HERS	Home Energy Rating System
HVAC	Heating, Ventilation, & Air Conditioning
ICC	International Code Council
IEPR	Integrated Energy Policy Report
IOU	Investor Owned Utility
LBNL	Lawrence Berkeley National Laboratory
LED	Light-emitting Diode
LGP	Local Government Partnership
MOU	Memorandum of Understanding
MR	Multi-faceted Reflector (lamps)
NRDC	Natural Resources Defense Council
NREL	National Renewable Energy Laboratory
OIR	Order Instituting Rulemaking
PG&E	Pacific Gas & Electric
PIER	Public Interest Energy Research
PIP	Program Implementation plan
PNW	Pacific North West
POU	Publically Owned Utility
QI/QM	Quality Installation and Quality Maintenance
QR Code	Quick Response Code
R&D	Research & Development
RD&D	Research, Development and Demonstration
RFI	Request for Information

SB	Senate Bill (California)
SCE	Southern California Edison
SCG	Southern California Gas
SDG&E	San Diego Gas & Energy
STDS	Standards
TDV	Time Dependent Valuation
U.S. DOE	United States Department of Energy
WE&T	Workforce Education and Training
WHPA	Western HVAC Performance Alliance
ZNE	Zero Net Energy

Table of Contents

1 BACKGROUND

1.1 Strategic Plan

Published in 2008, the California Long Term Energy Efficiency Strategic Plan outlines goals and strategies for key market sectors (commercial, residential, industrial, and agricultural) and crosscutting initiatives (such as heating, ventilation, and air conditioning (HVAC), codes and standards, research and technology).[1] In order to reduce barriers to the adoption of energy efficiency measures (to the point where publicly-funded intervention is no longer appropriate or necessary), the Plan embraces four specific programmatic goals, known as the Big Bold Energy Efficiency Strategies, which were set forth in California Public Utilities Commission (CPUC) Decision 07-10-032 and Decision 07-12-051.[2] The Strategic Plan focuses on market transformation and recognition that deep energy savings can be achieved only through a common vision and coordinated efforts of both utility and non-utility entities.

Ratepayer funded efficiency programs over time have been designed either to 1) encourage suppliers, manufacturers, designers and other market actors to provide efficiency products or services or to 2) encourage consumers and end-users to buy or use efficiency products and services. Voluntary rebate and other energy efficiency programs aim to increase the market penetration of energy efficiency products and practices until practices and/or products are sustainable in the market without the need for additional incentives or ratepayer subsidies; where appropriate, such measures and practices can then be incorporated into the building and appliance standards.

Codes and Standards are recognized as a critical part of key market transformation strategies, which provide the market "push" needed to spur innovation by removing less efficient choices from the market place and creating new, high performing products and building practices.

To guide market transformation in a number of key sectors, the Plan embraces the four "Big Bold Energy Efficiency Strategies."

BIG BOLD ENERGY EFFICIENCY STRATEGIES

All new residential construction in California will be zero net energy by 2020.

All new commercial construction in California will be zero net energy by 2030.

Heating, Ventilation and Air Conditioning (HVAC) will be transformed to ensure that energy performance is optimal for California's climate.

All eligible low-income customers will be given the opportunity to participate in the low-income energy efficiency program by 2020.

[1] California Energy Efficiency Strategic Plan, January 2011 update http://www.cpuc.ca.gov/NR/rdonlyres/A54B59C2-D571-440D-9477-3363726F573A/0/CAEnergyEfficiencyStrategicPlan_Jan2011.pdf

[2] California Public Utilities Commission Decision 07-10-032. (D.07-10-023) Available at:

http://docs.cpuc.ca.gov/word_pdf/FINAL_DECISION/74107.pdf

The Codes and Standards Chapter of the Strategic Plan sets forth the vision and goals that support advancing the ambitious goals of the Strategic Plan as well as California greenhouse gas (GHG) reduction mandates.

The two goals of the Codes and Standards Chapter are as follow:[3]

Goal 1: Continually strengthen and expand building and appliance codes and standards as market experience reveals greater efficiency opportunities and compelling economic benefits.

Goal Results: California's Codes and Standards will support the Strategic Plan's residential, commercial, and HVAC sector goals

Goal 2: Dramatically improve code compliance and enforcement.

Goal Results: Energy savings from codes and standards will be fully realized.

CODES AND STANDARDS STRATEGIC PLAN'S VISION:

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 wide-spread deployment of zero-net energy and highly efficient buildings and equipment. The effectiveness of codes and standards will be enhanced by improved compliance as well as coordinated voluntary efficiency activities.

1.2 Scope of the Codes and Standards Action Plan

While the Strategic Plan is a policy-oriented document that sets forth leadership and vision, the Codes and Standards (C&S) Action Plan provides a way to operationalize the role of Codes and Standards to achieve the goals of the Strategic Plan. This Action Plan provides a pathway to achieving the Strategic Plan's vision through meaningful engagement for key stakeholders and key regulatory and non-regulatory entities. While the impacts of Building and Appliance Energy Efficiency Standards are large, the current approaches and practices could be enhanced by:

- Capturing a wider-range of cost-effective and viable technologies and building practices, including integrated demand side management approaches;[4]
- Leveraging market transformation efforts through common visions and coordination with non-regulatory entities, such as utility incentive and rebate programs, Energy Star programs, and local government adoption of Reach Standards;
- Advancing building and appliance standards to support high performance buildings through integrated building design;

[3] California Energy Efficiency Strategic Plan, January 2011 update Chapter 7, page 62

http://www.cpuc.ca.gov/NR/rdonlyres/A54B59C2-D571-440D-9477-3363726F573A/0/CAEnergyEfficiencyStrategicPlan_Jan2011.pdf

[4] The statewide Integrated Demand Side Management (IDSM) program promotes integration of demand side (DSM) resources such as energy efficiency, demand response, and distributed generation within the investor-owned utilities' statewide demand side incentive programs.

- Expanding training and outreach activities to fully realize energy savings resulting from compliance; and,
- Supporting simplified and rigorous enforcement strategies.

Figure 1 below shows the triennial building standards update cycle which, when matched with the state policy Zero Net Energy (ZNE) milestones, shows that there are two cycles to get to ZNE for residential newly constructed buildings and five for nonresidential newly constructed buildings. Also shown at the bottom of the figure are the projected Investor Owned Utility (IOU) Program cycles. Through integration with Codes and Standards, every program in the IOU portfolios, in particular New Construction, HVAC, Lighting, Workforce Education and Training (WE&T), Emerging Technology (ET) and Local Government programs, forms a very important resource and market adoption and support structure for advancing the state's energy efficiency standards, and compliance with them.

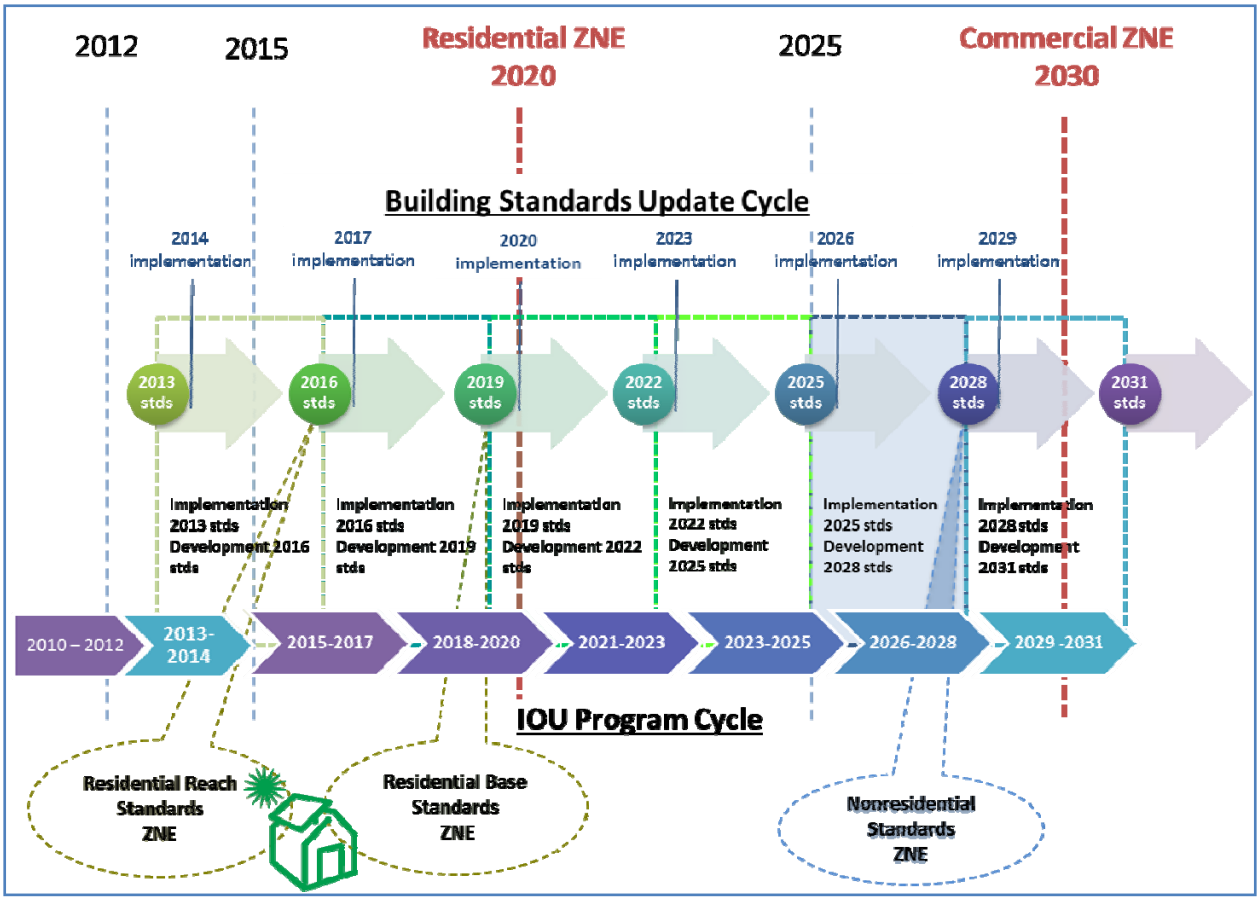

Figure 1: Timeline for Building standards update cycles, IOU Program cycles and the Strategic Plan ZNE goals

C&S Action Plan Approach

The content of this Action Plan has been developed primarily through coordinated efforts between staff from the California Energy Commission's Building and Appliance Standards Offices, the California Public Utilities Commission's Energy Division, and the California Investor Owned Utilities (IOUs) Statewide Codes and Standards Program along with their consultants. In addition, the Plan has been vetted with

key market actors whose invaluable contribution has been incorporated in the document. [5]

Every effort has been made to accurately represent the intent and contributions of the stakeholders who participated in the development of this Plan. Volunteers were solicited to serve as initiative leads to ensure the actions and initiatives identified in the plan are implemented, and future efforts are achieved with a unified vision and goals among the key entities who are involved in the codes and standards landscape.

The C&S Action Plan consists of two main chapters:

- California Building Energy Efficiency Standards
- California Appliance Efficiency Standards

Each of the two chapters includes a Chapter **Vision** statement enunciated by the stakeholders who developed this action plan to guide the current and future activities in these two areas. In addition, each chapter outlines **Key Strategies**[6] that are developed to address the two goals of the Codes and Standards chapter of the Strategic Plan. Under each key strategy, a number of **Key Initiatives** were developed to implement the actions required to advance the goals of the plan. For each initiative, **initiative leads**[7] are identified to implement the activities. The timeline for this plan encompasses all activities initiated during the years 2012 to 2015. There is a specific timeline for each initiative in the document that indicates the planned start and completion times.

Prioritized Strategies:

The C&S Chapter of the Strategic Plan sets two main goals that were used to guide the development of this Action Plan. The C&S Action Plan is designed to set key initiatives and timelines (2012-2015) to address these goals. Some of these key initiatives have a designated timeline that starts in 2012 to 2013 in support of the implementation of the 2013 Building Energy Efficiency Standards, as well as Phase I of the Appliance Efficiency Standards Order Instituting Rulemaking (OIR).[8] The timely execution of these initiatives is critical to the successful implementation of these Standards. In addition, some of these initiatives support the future development of 2016 and 2019 Building Energy Efficiency Standards, both Mandatory and Reach Standards, as well as Phase II and III of the Appliance Efficiency Standards OIR. Initiative leads have committed to ensure the timely execution of these initiatives, in order to facilitate the advancement of future Standards development.

In the discussion of the many sectors and programs it addresses, the Strategic Plan refers repeatedly to the need for coordination with Codes and Standards, recognizing that the Standards are a critical means of achieving energy efficiency for a wide range of technologies, market sectors and end uses. The key initiatives in this Action Plan are prioritized to achieve the Strategic Plan's goals, with full attention to the need for integration of all of the programs in the IOU portfolios with the C&S Program.

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[5] The names of all contributors are listed in Appendix A.

[6] Note that the strategies included in this document are distinct from those outlined in the Strategic Plan Chapter. The strategies in this action plan are specific to each chapter and were developed by the Action Plan authors.

[7] Note that initiative leads are entities responsible for either directly implementing and/or overseeing the implementation of an initiative. These leads have either volunteered and/or are already working on some aspects of the action plan as part of their professional work.

[8] Refer to Chapter 3 on the background regarding the Appliance Standards OIR

The chapter on California Building Energy Efficiency Standards (Title 24) includes the following five key strategies:

Strategy 1: Develop progressive initiatives through the advancement of Building Energy Efficiency Standards and Reach Standards to enable market transformation and support high performance building design and operation in residential and nonresidential sectors.

Strategy 2: Develop and enhance the electronic infrastructure and supporting tools to enable the advancement of Building Energy Efficiency Standards and compliance improvement.

Strategy 3: Enhance education and training initiatives for improving compliance with Building Energy Efficiency Standards and Reach Standards.

Strategy 4: Expand coordination and outreach initiatives between regulatory and non-regulatory agencies and other key market actors to facilitate improvement in compliance with the Building Energy Efficiency Standards.

Strategy 5: Support efforts towards Standards compliance improvement and enforcement at the local level for the Building Energy Efficiency Standards, both Mandatory and Reach Standards.

The chapter on California Appliance Efficiency Standards (Title 20) includes the following three key strategies:

Strategy 1: Develop progressive initiatives to enable market transformation toward highly efficient appliances.

Strategy 2: Expand coordination initiatives between regulatory and non-governmental agencies, associations, and industry leads to facilitate the development and adoption of highly efficient appliances.

Strategy 3: Enable higher compliance with Appliance Standards and regulations.

1.3 Critical Success Factors

Statewide Integration and Coordination: The initiative leaders need to convene on a regular basis to enhance the coordination amongst the stakeholders, monitor the implementation of the initiatives, and share the knowledge and lessons learned.

Financial Viability: Securing the funding required to implement the strategies and key initiatives identified in this action plan is imperative to meet the Plan's goals.

Robust RD&D Agenda: In order to realize the vision of this chapter, there is a need for targeted collective efforts among the RD&D community, including the Energy Commission's RD&D programs (PIER and EPIC), the IOU Research and Technology Demonstration programs, and other public and private research efforts, to establish and pursue a robust research agenda to steer the activities toward achieving the ZNE goals envisioned in the Strategic Plan.

Track and Report on Progress: The successful advancement of the goals contained in this Plan will require timely execution of the initiatives, the commitment and leadership of the stakeholders, and continuous monitoring and reporting of progress toward achievements.

Short-term Outcomes: The success of the implementation of this Action Plan depends on meeting the key initiatives within the established timeline. However, the true success of pursuing these initiatives will be achieved only if the intended outcomes are realized. Short-term outcomes should be established by each working group to ensure the success of this Plan.

Long-term Outcomes: The ultimate success of this Plan will be achieved when the visions in each Chapter are realized. Given that achievement of the visions call for aggressive goals, every attempt should be made by the initiative leaders to focus their efforts toward meeting those visions and ultimately achieving the market transformation goals toward ZNE envisioned in the Strategic Plan.

1.4 Action Plan Development Process

A series of coordination meetings starting in mid-2011 brought together the core contributor groups, Energy Commission Building Standards and Appliance Standards staff, CPUC Energy Division Staff, IOU Codes and Standards Program staff, and consultants supporting each organization to develop the key strategies and initiatives outlined in this Action document. Several focused discussions were conducted with these people over time to produce a draft, which was presented to an invited group of stakeholders at a roundtable event hosted at the Energy Commission in June 2012.

1.5 Implementation Approach

The Energy Commission and CPUC are planning to continue the Action Plan implementation through quarterly update meetings with Initiative Leads and annual meetings with the wider stakeholder audience such as POUs, energy consultants and building industry among others to provide update and progress on initiatives.

2 CALIFORNIA BUILDING ENERGY EFFICIENCY STANDARDS

2.1 Vision

The vision for Building Energy Efficiency Standards is to develop standards that address newly constructed buildings, and additions or alterations to existing buildings, to include all cost-effective[9] energy efficient and distributed generation technologies and construction practices, in each subsequent update cycle. This includes renewable electric generation systems in the Building Energy Efficiency Standards to reduce buildings' needs for grid-supplied energy, when proven to be cost-effective.

Another aspect of the vision is to address compliance with the Building Energy Efficiency Standards, which are enforced by local jurisdictions who understand the financial and other benefits of energy efficiency for their constituents. Through education and outreach, consumers should be enabled (empowered?) to demand energy efficient buildings that comply with or exceed these Standards.

VISION

Newly constructed buildings and additions or alterations to existing buildings will include all cost-effective energy efficient technologies and construction practices. When proven to be cost-effective, renewable electric generation systems will be included in the Building Energy Efficiency Standards to reduce buildings' needs for grid-supplied energy.

Building Energy Efficiency Standards are enforced by local jurisdictions who understand the financial and other benefits of energy efficiency for their constituents. Consumers demand energy efficient buildings that comply with or exceed these Standards.

The 2011 Integrated Energy Policy Report (IEPR)[10] lists the following recommendations for the Building Energy Efficiency Standards:

- The Energy Commission should adopt triennial building standards updates that increase the energy efficiency of newly constructed buildings in every triennial update as needed to achieve ZNE standards for newly constructed homes by 2020.
- The Energy Commission should adopt reach standards for newly constructed buildings that provide best practices energy efficiency levels for the marketplace to strive for and serve as a means to pull the industry rapidly to the level needed to achieve ZNE goals.
- The Energy Commission, CPUC, local governments, the state's utilities, and builders should collaborate to encourage the building industry to reach these advanced energy efficiency levels in a substantial segment of the market through industry- specific training and financial incentives.
- The Energy Commission and CPUC should coordinate future investor-owned utility "new construction-related" programs with the Energy Commission's efforts to meet the ZNE goals through triennial updates of mandatory and reach standards. By offering incentives for achieving

[9] Life-cycle cost Methodology – 2013 Building Energy Efficiency Standards http://www.energy.ca.gov/title24/2013standards/prerulemaking/documents/general_cec_documents/2011-01-14_LCC_Methodology_2013.pdf

[10] California Energy Commission, 2011 Integrated Energy Policy Report. Publication Number: CEC-100-2011-001-LCF. http://www.cpuc.ca.gov/NR/rdonlyres/A54B59C2-D571-440D-9477-3363726F573A/0/CAEnergyEfficiencyStrategicPlan_Jan2011.pdf

reach standards, providing technology demonstration and development, and conducting pilot programs for demonstrating ZNE solutions, new technologies and building practices will be integrated into upcoming triennial updates of the Building Standards quicker and with more success.

- The Energy Commission, CPUC, builders, and other stakeholders should collaborate to accomplish workforce development programs to impart the skills necessary to change building practices to accomplish ZNE in newly constructed buildings.
- The Energy Commission should focus significant resources during the next Building Standards update on efficiency improvements in building additions and alterations.
- The Energy Commission and CPUC should emphasize joint efforts to achieve improved compliance with the Building Energy Efficiency and Appliance Standards.

2.2 Key Strategies

Strategy 1: Develop progressive initiatives through the advancement of Building Energy Efficiency Standards, both Mandatory and Reach Standards, to enable market transformation, and support high performance building design and operation in residential and nonresidential sectors.

Strategy 2: Develop and enhance the electronic infrastructure and supporting tools to enable the advancement of Building Energy Efficiency Standards and compliance improvement.

Strategy 3: Enhance education and training initiatives for improving compliance with both Mandatory and Reach Building Energy Efficiency Standards.

Strategy 4: Expand the coordination and outreach initiatives among regulatory and non-regulatory agencies and other key market actors to facilitate improvement in compliance with the Building Energy Efficiency Standards.

Strategy 5: Support efforts toward Standards compliance improvement and enforcement at the local level for the Building Energy Efficiency Standards, both Mandatory and Reach Standards.

2.3 Key Initiatives for Advancement of Building Energy Efficiency Standards

Strategy 1: Develop progressive initiatives through the advancement of the Building Energy Efficiency Standards, both Mandatory and Reach Standards, to enable market transformation and support high performance building design and operation in residential and nonresidential sectors.

To address the first goal of the Codes and Standards Chapter in the Strategic Plan,[11] this strategy contains ten key initiatives. This introductory section provides an overview of the rationale regarding the importance of these initiatives.

Advancing Building Energy Efficiency Standards Research

The Warren-Alquist Act,[12] enacted in 1976, mandated that the Energy Commission create and periodically update Building Energy Efficiency Standards (Standards) for the State of California. These Standards address newly constructed buildings and additions and alterations to existing buildings. The Standards have, in combination with appliance efficiency standards and utility-sponsored incentive programs, strongly contributed to California's per capita electricity consumption levels remaining relatively flat since the mid-1970s. First adopted in 1977, the Standards have been periodically updated approximately on a three-year cycle. The current 2008 Building Energy Efficiency Standards went into effect on January 1, 2010 and were updated in 2013 with Standards that go into effect January 1, 2014.

A key to advancing innovation in the market place is through the continual completion of research and analysis studies that address both technology advancement and technology adoption in the marketplace. Continual research that supports the development of future standards and potential efficiency measures that are not currently covered by Building Energy Efficiency Standards, is critical to the advancement of future standards.

Codes and Standards Enhancement (CASE) Studies

Advocacy for more stringent building and appliance standards is one of the major activities of the IOUs' C&S statewide program. A major part of the advocacy work is the research and technical analysis to justify and support the CEC's proposed changes to existing Standards. This research evaluates the feasibility and life-cycle cost effectiveness of potential standards, and is presented in reports referred to as Codes and Standards Enhancement (CASE) reports. A key necessity for incorporating new measures into the Energy Efficiency Standards is establishment of the calculation methodology that estimates the energy savings of the measures. These calculations are also important for establishing a mechanism for estimating energy savings for the measure when showing compliance with the performance standards. The Energy Commission must establish such calculation approaches for all measures that the Energy Commission approves to be used to show compliance with the Standards; such measures are termed "compliance options."

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[11] California Energy Efficiency Strategic Plan, January 2011 update http://www.cpuc.ca.gov/NR/rdonlyres/5D0472D1-0D21-46D5-8A00-B223B8C70340/0/StrategicPlanProgressReportOct2011.pdf

[12] http://www.energy.ca.gov/2012publications/CEC-140-2012-001/CEC-140-2012-001.pdf

The performance approach allows flexibility in the design and installation of technologies, as long as the estimated energy use for the totality of measures proposed for inclusion in a building meets the energy budget, which is calculated for that building if the building was designed to comply with the prescriptive standards. Compliance with the performance approach requires the use of Energy Commission-approved software tools that implement the modeling rules specified by the Energy Commission, including those for all compliance options. Compliance options that are approved for new technologies provide the opportunity for these new measures, which are technically feasible and have high potential for savings but may be relatively expensive, to be explored and market-tested while helping buildings to achieve compliance.

The IOUs' Emerging Technologies Program (ETP) conducts numerous initiatives to bridge the gap between R&D and market adoption of new and/or unproven technologies, as well as emerging and/or under-utilized technologies; reports about these ETP initiatives are published on the Emerging Technologies Coordinating Council (ETCC)[13] website. This information is key to understanding the technical potential and performance of new technologies, potentially helping to accelerate their market adoption and possible inclusion into future standards.

The CPUC's Energy Division also conducts numerous studies on market research and analysis as well as Evaluation, Measurement and Verification (EM&V) studies that produce information regarding energy savings from many energy efficiency measures and approaches. This information could be better used by the Energy Commission to support the analysis of current market practice and the advancement of future standards. [14]

Some of the major collaborators that provide support to the Energy Commission through the Standards development process[15] include:

- Ratepayer-funded Codes and Standards CASE Initiatives by PG&E, SCE, SDG&E, and SCG;
- Publicly funded RD&D programs (such as PIER, now EPIC, ETP);
- Product manufacturers, builders and clean energy advocates.

Reach Standards

The Energy Commission uses the term "Reach Standards" to describe voluntary standards that establish advanced levels of energy efficiency that are more stringent than the Statewide Mandatory Standards. The Reach Standards are adopted as the voluntary energy provisions in the California Green Building Standards (*CAL*Green, Title 24, Part 11); in so doing, it is the intent of the State to encourage green buildings to achieve exemplary performance in the area of energy efficiency, at least to the level of the Reach Standards. The Energy Commission encourages the Reach Standards to be widely used as a consistent reference standard for preferred energy savings levels beyond that required by the Mandatory Standards. For the 2008 Standards the Reach Standards are required by the Energy Commission as minimum levels of energy efficiency to qualify solar electric generation (photovoltaic) systems installed on newly constructed residential and nonresidential buildings for the State's California

[13] http://www.etcc-ca.com/index.php

[14] Such studies can be found at http://calmac.org/

[15] http://www.energy.ca.gov/title24/2013standards/prerulemaking/documents/2011-04-04_workshop/presentations/Building_Standards_workshop_presentation_by_Mazi_Shirakh_2011-04-04_2013.pdf

Solar Initiative and New Solar Homes Partnership incentives. For the 2013 Standards there is an option for a lower incentive for newly constructed residential buildings that are "compliant" with the Building Energy Efficiency Standards. A higher incentive will be available to residential buildings that incorporate additional energy efficiency measures. The Reach Standards can be used as a basis for incentives by utility programs, and adopted as Local Ordinances. The Reach Standards have also been adopted by the California Tax Credit Allocation Committee as "minimum construction standards" for all newly constructed affordable housing projects in the state to qualify for federal and state tax credits.

The Reach Standards, while not mandatory at the state level, can get codified through adoption as local ordinances by city or county jurisdictions. The Warren-Alquist Act and the Building Energy Efficiency Standards administrative regulations establish a process, which allows local governments[16] to adopt ordinances and enforce energy standards that are more stringent than the statewide Standards, requiring additional energy conservation measures, and/or setting more stringent energy budgets, along with onsite renewable electric generation in some cases. Reach Standards include requirements for newly constructed buildings, as well as additions and alterations to existing buildings, for both residential and nonresidential construction.

Reach Standards use the same energy-use metric as that used for the Mandatory Standards to define performance objectives that encourage the market to adopt higher levels of energy efficiency. This enables the utility New Construction incentive programs to base their offerings on Reach Standards to encourage voluntary adoption of higher levels of efficiency. Moreover, Reach Standards can allow the inclusion of onsite renewable generation credits and/or requirements, which are important to push the market toward ZNE goals. Reach Standards establish a precursor to the adoption of future Mandatory standards, and provide a vehicle to "test drive" the market readiness of new, innovative measures, and help drive down the cost of those measures.

Integrated Building Design

Integrated building design[17] is often a no- to low-cost investment, which has the potential of huge energy saving results if initiated from the early stages of design. The intent of addressing integrated building design in codes and standards is to encourage it as a new design paradigm. The initiatives encouraging and incentivizing this strategy through IOU New Construction programs will facilitate market readiness for future adoption of integrated building design solutions.

TDV, Demand Response, and Energy Storage

The Energy Commission, in collaboration with the IOUs, developed the Time Dependent Valuation (TDV) approach to value energy for the first time in the 2005 Standards.[18] TDV weighs energy based on the time and location it is used or saved; the concept behind TDV is that energy savings should be valued depending on which specific day and hour of the year the savings occur, to better reflect the actual costs of energy to consumers, to the utility system, and to society.[19] The TDV energy valuation approach

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[16] http://www.energy.ca.gov/title24/2008standards/ordinances/

[17] The purpose of Integrated Building Design is to effectively manage the optimization of complex systems that effectively minimize energy load of the building.

[18] A similar time-dependent approach is used by the CPUC in determining the avoided cost of DSM programs.

[19] Time Dependent Valuation of Energy for Developing Building Efficiency Standards 2013 Time Dependent Valuation (TDV) Data Sources and Inputs February 2011 – E3 report to Energy Commission – http://www.energy.ca.gov/title24/2013standards/prerulemaking/documents/general_cec_documents/Title24_2013_TDV_

encourages the building industry to design and construct buildings to perform well during periods of high energy costs. Though primarily developed to promote statewide and regional electricity system reliability and cost control, TDV addresses seasonal natural gas and propane costs as well. The TDV methodology gives more weight to on-peak hours and less weight to off-peak hours. This means that energy efficiency measures that perform better on-peak will be valued more highly than measures that do not.

While TDV accounts for energy efficiency measures impacting all fuel types, it may need to be modified for future standards to include all electricity infrastructure costs associated with integration of onsite renewable electric generation systems into the grid. The Energy Commission and its partners will need to continue updating the TDV methodology before each Standards update to reconsider the forecasts of all relevant energy costs for all fuel types and generation sources.

Also, it will be increasingly important as the Standards approach zero net energy levels of performance, to explain to builders, consumers and other stakeholders that TDV is intended to represent the actual cost of energy to consumers, the utility system, and society and therefore will not match any one building's actual utility bills. The TDV approach may also apply to demand response and energy storage, as they directly address the impact of using energy at peak times when it is valued the most by the TDV methodology. Demand responsive technologies are important measures to pursue to minimize peak load and grid impacts. Demand response and energy storage technologies will become increasingly important as the Standards advance towards zero net energy levels of performance.

Exploring options to address the inclusion of demand response technologies in codes and standards will provide additional ways to avoid the construction of more power plants that would otherwise be needed to meet growing peak demands. Energy storage, both electric (batteries, conventional, and Lithium-ion) and thermal (such as ice storage), provide options that allow peak shaving and energy saving at times when they are weighted the highest by TDV.

Key Initiatives	Timeline	Initiative Leads
1. Energy Commission to collaborate with CPUC, IOUs, and other CA utilities to update Time Dependent Valuation (TDV) to provide the appropriate balance of statewide coincident demand costs and regional energy delivery costs,[20] including those due to high penetration of renewable energy resources.	Q2 2013 – Q2 2014	Martha Brook (Energy Commission)
2. CPUC to coordinate with the Energy Commission to share findings from current studies and seek contribution in the development of future studies administered by the CPUC's Energy Division.	Ongoing	Carmen Best (CPUC) Eurlyne Geiszler (Energy Commission)

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[20] Such as Generation Energy, System Capacity, Ancillary Services, T&D Capacity and GHG emissions, among others.

Key Initiatives	Timeline	Initiative Leads
3. IOUs to organize and facilitate statewide cross-functional teams including the IOU Voluntary programs, CPUC, and other key market actors to identify Standards' priorities relative to policy goals.	Q1 2013	Pat Eilert (PG&E) Randall Higa (SCE) Ron Gorman (SDG&E) Adrian Salas (SCG)
4. Energy Commission to continue collaborating with IOU C&S program in developing "reach standards" in every Standards cycle to launch measures that can become requirements in the subsequent cycle.	Ongoing	Martha Brook (Energy Commission) Randall Higa (SCE)
5. IOU C&S program to continue providing technical assistance to local jurisdictions wishing to adopt local ordinances (higher than statewide Mandatory Building Energy Efficiency Standards).	Ongoing	Jill Marver (PG&E) Javier Mariscal (SCE) Adrian Salas (SCG)
6. IOUs C&S and Local Government Partnership (LGP) programs to collaborate with local planning departments to assist in recognizing the GHG reduction benefits of adopting local ordinances.	Q2 2013	Jill Marver (PG&E) Javier Mariscal (SCE) Adrian Salas (SCG)
7. IOU C&S and ETP programs to coordinate with the Energy Commission to develop test, and implement advanced technologies and supporting tools, such as compliance options, that are market ready and can help achieve deeper energy savings.	Q1 2013 Ongoing	Randall Higa (SCE) Edwin Hornquist (SCE) Martha Brook (Energy Commission)
8. IOU C&S, ETP, and New Construction programs to collaborate with the Energy Commission to encourage maximum amount of construction to achieve Reach Standards and emphasize measures needed to be incorporated into future Standards to achieve ZNE goals by 2020 and 2030.	Q2 2013 – Q4 2014	Randall Higa (SCE) Edwin Hornquist (SCE) Chip Fox (Sempra) Craig Hoellworth (Energy Commission)
9. IOU New Construction Programs to engage with architects and design community through program offerings for implementing advanced integrated building design approaches.	Q1 2013 Ongoing	Chip Fox (Sempra)
10. Energy Commission to coordinate with Demand Response Research Center,[21] CPUC, and other market experts to explore including advanced Demand Response and Energy Storage in future Standards, as appropriate.	ongoing	Martha Brook (Energy Commission)

[21] The Demand Response Research Center at LBNL http://drrc.lbl.gov/

2.4 Key Initiatives for Enhancement of Supporting Tools for Building Standards

Strategy 2: Develop and enhance the electronic infrastructure and supporting tools to enable the advancement of Building Energy Efficiency Standards and compliance improvement.

Software Development Objectives

Enhancing the electronic infrastructure for tools supporting the development of and compliance with the Standards is critical to ensure meeting the ZNE goals. California's Building Energy Efficiency Standards offer both a prescriptive and performance approach. These compliance tools are important for building industry professionals, enabling them to ensure compliance while innovating on design and installation solutions. Also, compliance related data is critical to the compliance and enforcement process, moving through many actors who have roles in the stages of review and approval, such as:

- Energy consultants and building department professionals
- Home Energy Rating System (HERS) raters
- Nonresidential acceptance test technicians

All of the compliance and enforcement communication, interactions and transactions benefit from a supportive electronic infrastructure.

Compliance Software

The Warren-Alquist Act[22] requires the Energy Commission to "develop a public domain computer program which will enable contractors, builders, architects, engineers and government officials to estimate the energy consumed by residential and nonresidential buildings" in order to implement California's Building Energy Efficiency Standards. The Standards include a performance-based compliance approach that requires the use of software that is certified by the Energy Commission for this purpose.[23]

To meet the Warren-Alquist Act mandate, the Energy Commission must (1) establish reference methods for modeling the energy-related features of building designs, and (2) provide publicly available Standards compliance software. The reference methods establish the engineering basis for estimating the hourly energy use of residential and nonresidential buildings across California's climate regions, and are used to determine the energy cost savings expected from potential updates to the Standards. The Energy Commission also uses these reference methods (separate methods for residential and nonresidential buildings) as the basis of comparison during the compliance software certification process, where private vendors can submit software for Energy Commission approval.

For the 2013 Residential Standards reference method, California's IOUs collaborated with the Energy Commission to co-fund the development of the California Simulation Engine (CSE). The CSE is a rigorous

[22] http://www.energy.ca.gov/2012publications/CEC-140-2012-001/CEC-140-2012-001.pdf

[23] Published ACEEE paper: "The BEE Software Collaborative: An Open Source, Rule-Based Architecture for Building Energy Efficiency." Martha Brook, California Energy Commission and Scott Criswell, Wrightsoft Corporation.

residential building simulation tool based on thermodynamics principles, which avoid the simplifying assumptions for solar gains and mass transfer that have been used in previous software tools, including the previous residential reference method, CALRES.[24]

The 2013 Nonresidential Standards reference method is EnergyPlus, the building simulation tool supported by the U.S. DOE, which will allow the Energy Commission to establish a basis of comparison for modeling a much broader set of building energy technologies and control systems than was possible in previous Standards cycles. EnergyPlus also is available under an open source software license.

The framework outlined in Figure 2 enables the ability to develop rule sets for incentive programs, local ordinances and future Standards that all work with the same base calculation engine. This will provide consistency in simulation results, and allow more performance-based analysis to be completed by a wider group of industry stakeholders.

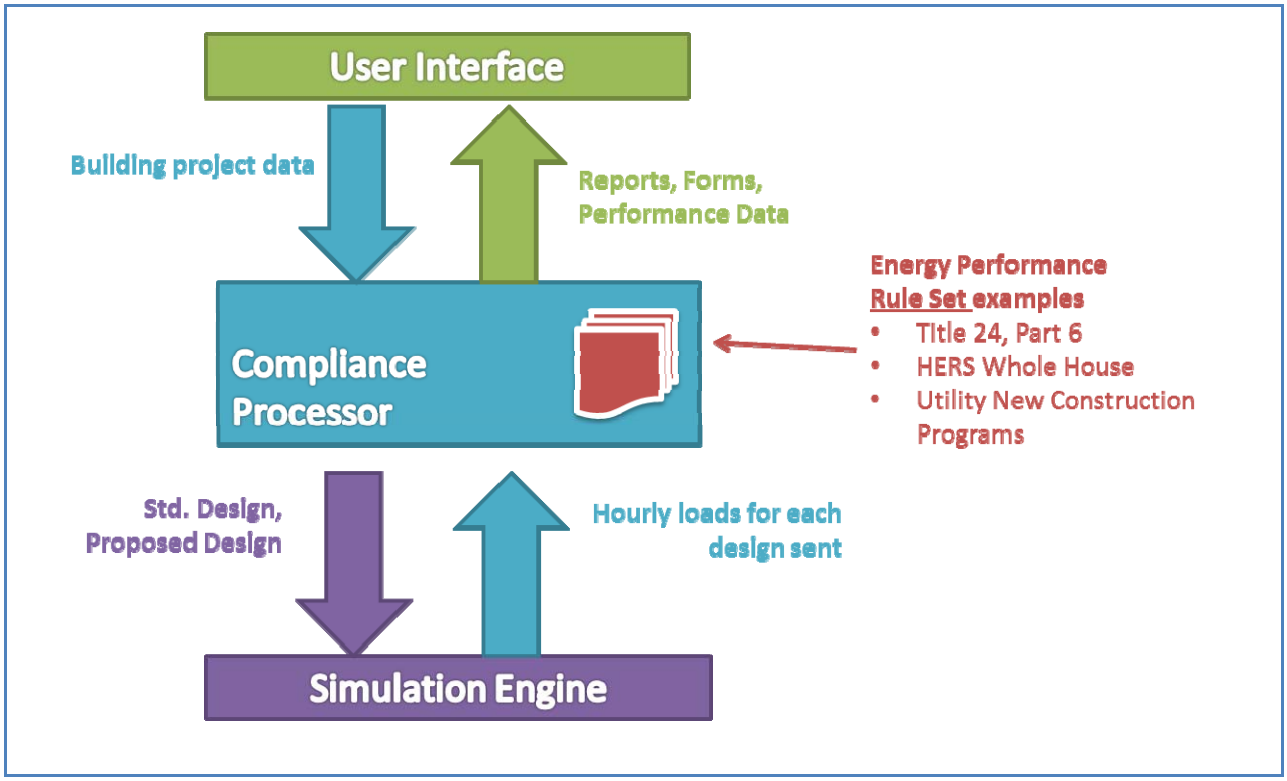

Figure 2: Conceptual diagram of the ratepayer funded compliance software architecture

Standards Development Platform

While the compliance software works at the compliance end of the process after Standards have been developed, there is also a need for a simulation platform that allows for the comprehensive assessment of all important measures while they are being considered for adoption into Standards. A Standards development analysis platform would provide a consistent methodology to the process, and streamline

[24] CALRES has been the public domain computer program offered by the Energy Commission for use in residential compliance prior to the 2013 Standards.

the prioritized selection of measures for future Standards. The National Renewable Energy Laboratory (NREL)-developed tool, BEopt,[25] is an example of an analysis platform for residential buildings, but, in its current implementation, BEopt does not have the California and Building Energy Efficiency Standards-specific methodology to drive it. Platforms for both residential and nonresidential sectors are needed to support the robust analyses necessary for future Standards development. The platforms to be developed should leverage work done by NREL and others to optimize life-cycle costs and target energy saving measures until onsite renewable electric generation becomes the most cost-effective remaining means to get to ZNE.

Data Registry and Repository

Section 10-103 of the Building Energy Efficiency Standards administrative regulations defines the Permit, Certificate, Information, and Enforcement Requirements.[26] The 2013 Standards administrative regulations retain the existing residential HERS provider Data registries. The regulations also allow for the creation of nonresidential data registries, which are approved by the Energy Commission. The regulations require registration of all nonresidential compliance documents, if by January 1, 2015 a nonresidential Provider is approved by the Energy Commission. Existing HERS provider Data registries may register nonresidential documents, and other entities may apply to be Nonresidential Registration Providers also. The regulations also add an Energy Commission-administered, document repository feature to the electronic documentation registration procedures—when documents are registered in a HERS data registry or a Nonresidential data registry, a copy of each document will be archived in an electronic document repository in the custody of the Energy Commission, which will be utilized for enforcement, public information requests, and energy research. Currently, there is no source of funding identified for the development of the repository.

The following section describes the proposed development of the Data Registry and Repository that was adopted for the 2013 Standards.

Document registration is the process for verifying, signing, and registering electronic compliance documents produced using a method approved by the Energy Commission. Registration Providers are approved by the Energy Commission to implement and manage the procedures for registering documents in Approved Data Registries. The procedures include authenticating and approving users to submit or sign electronic documents and data for registration, validating that these data and documents are completed in conformance with the requirements defined by the Building Energy Efficiency Standards Section 10-103(a) and Reference Joint Appendix JA7, and affixing the electronic signature of the documentation author. The registration process is completed only when an authorized registration signer signs the compliance document electronically, whereupon, the Data Registry automatically performs the following actions:

- Adds the registration signer's electronic signature to the document's signature block.
- Appends a unique registration number to each page of the document.
- Applies the Registration Provider's digital certificate, containing his or her digital signature to the entire compliance document.

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[25] http://beopt.nrel.gov/

[26] http://www.energy.ca.gov/title24/2013standards/prerulemaking/documents/2011-10-13_14_workshop/presentations/Staff_Presentation_10-14_all.pdf

- Displays the Registration Provider's watermark and registration date and time record information on document

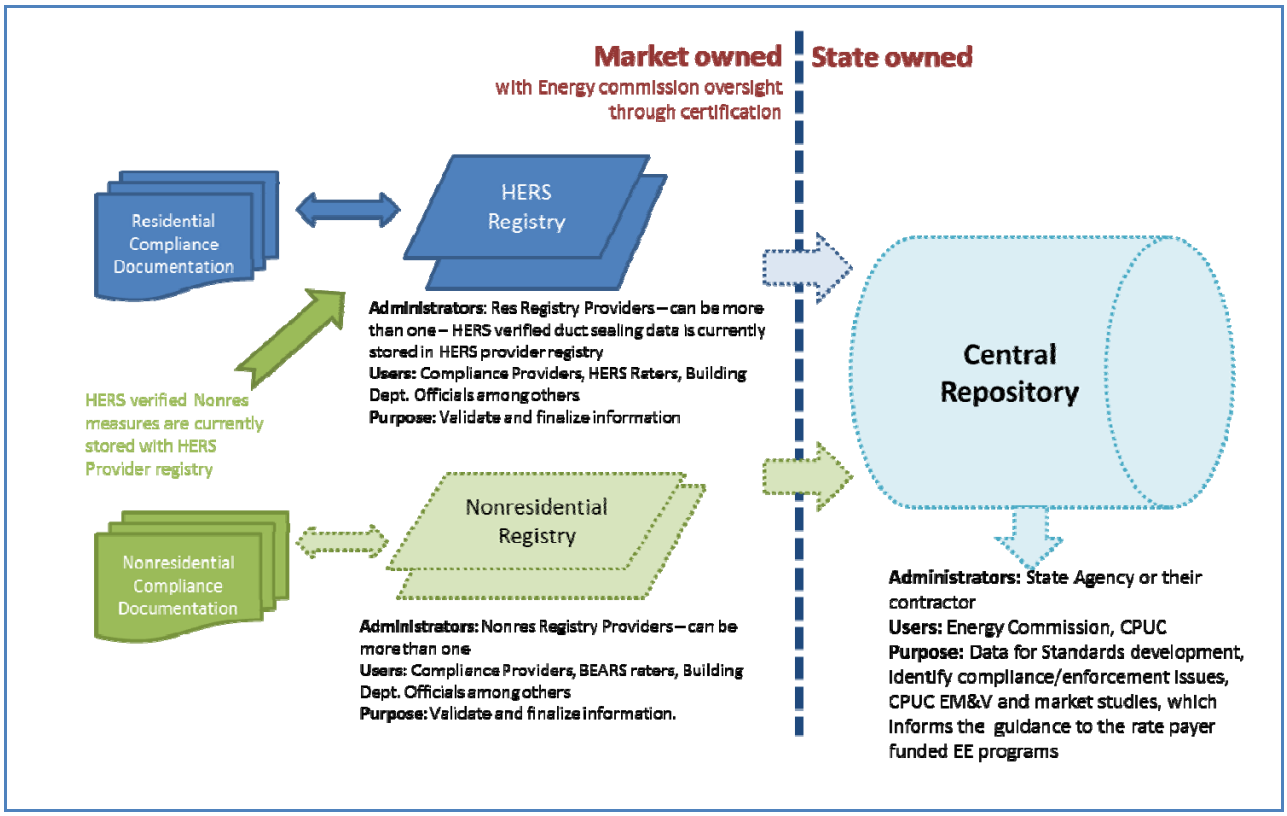


Figure 3: Conceptual depiction of the registry and repository

When the document registration process has concluded, the Data Registry immediately and automatically transmits a copy of the completed registered compliance document to the Energy Commission Compliance Document Repository. The Data Registry also retains a copy of the registered compliance document for use by authorized users. Paper copies of registered compliance documents printed directly from the Data Registry website, or electronic copies downloaded from the Data Registry website, are required to be used for submittal to enforcement agencies or other parties to the building construction project. The Registration Provider's digital signature provides for automatic electronic verification of the authenticity of electronic copies of registered documents.

The Commission established the following definitions in the 2013 Standards and Reference Appendices:

> DATA REGISTRY is a web service with a user interface and database maintained by a Registration Provider that complies with the applicable requirements in Reference Joint Appendix JA7, with guidance from the Data Registry Requirements Manual, and provides for registration of residential or nonresidential compliance documentation used for demonstrating compliance with the Building Energy Efficiency Standards.
>
> HERS DATA REGISTRY is a data registry that is maintained by a HERS Provider that provides for registration, when required by the Building Energy Efficiency Standards, of all residential compliance documentation and the nonresidential HERS verified measures.
>
> NONRESIDENTIAL DATA REGISTRY is a data registry that is maintained by a HERS Provider or a Registration Provider approved by the Energy Commission that provides for registration, when required by the Building Energy Efficiency Standards, of all nonresidential compliance

documentation, other than for the HERS verified measures. ENERGY COMMISSION COMPLIANCE DOCUMENT REPOSITORY (also known as an electronic document repository) is an electronic database and document storage software application used for retention of Registered Electronic Compliance Documents generated by Data Registries, and also may contain data and documentation relevant to other regulatory procedures administered by the California Energy Commission. The electronic copies of the registered documents retained by the Energy Commission Compliance Document Repository shall be utilized to satisfy public information requests, perform research, and shall be maintained in a manner conforming to Evidence Code Section 1530-1532 (in the custody of a public entity) for use in enforcement of the Standards.

Development of the Data Registry and Repository is important at all levels of the Standards program, from development of the Standards to compliance and enforcement. To enable the effective and systematic design and implementation of compliance software to generate the registry information and of the registry to upload the data to a central repository, detailed specifications must be developed and followed for the software, data registry and data repository. The development of those specifications must establish and address use case models that define the potential users and information that will need to be transferred and stored. The development of the software and HERS data registries are currently underway. There is no source of funding identified for the development of the repository.

Key Initiatives	Timeline	Initiative Leads
1. IOUs C&S Program to coordinate with Energy Commission to develop: 2. Validated software rule sets, both for residential and nonresidential, for inclusion in compliance software certified by the Energy Commission for the 2013 Standards • ACM documentation for the CASE measures adopted in the 2013 Standards	Q3 2012 – Q2 2014	Randall Higa (SCE) Martha Brook (Energy Commission)
3. IOU C&S Programs to develop validated rule sets for Reach Standards in the compliance software framework for use by the new construction incentive programs, local government ordinances and other programs.	Q1 2015 – Q4 2015	Randall Higa (SCE) Steven Long (SCE) Chip Fox (Sempra)
4. IOUs and the Energy Commission to coordinate with CPUC to develop use cases and specifications for the development of the Electronic Document Repository to house all registered residential and nonresidential compliance documentation.	Q1 2013 – Q3 2013	Adrian Salas (SCG) Carmen Best (ED/CPUC) Mazi Shirakh (Energy Commission)

Key Initiatives	Timeline	Initiative Leads
5. IOU C&S Programs to collaborate with Energy Commission to develop an electronic infrastructure whitepaper document for the building standards to support both development and compliance activities.[27]	Q1 2013 – Q2 2014	Jill Marver (PG&E) Martha Brook (Energy Commission)
6. Energy Commission to coordinate with the IOU (ETP and C&S) on the development of two software platforms,[28] residential and nonresidential, that enable optimization of cost-effective energy efficiency measure combinations. The development of these platforms will facilitate the adoption of future standards leading to ZNE buildings.	Q1 2013 – Q3 2014	Martha Brook (Energy Commission) Randall Higa (SCE) Edwin Hornquist (SCE)
7. IOUs to coordinate with Energy Commission to support the development of an electronic reference system that would link the Standards, Compliance Manuals, Appendices, and ACM Manuals, and ease navigation from one resource to another.	Q1 2013 – Q1 2014	Stuart Tartgalia (PG&E) Pedro Gomez (Energy Commission)

[27] The scope should include identification of the infrastructure needs for 2016 and beyond.

[28] The platforms should be ready in time to be used for the development of the 2016 Standards.

2.5 Key Initiatives for Education and Training on Building Standards

Strategy 3: Enhance education and training initiatives for improving compliance with Building Energy Efficiency Standards, both Mandatory and Reach Standards.

Compliance with the Mandatory Building Energy Efficiency Standards and voluntary compliance with the Reach Standards involves a series of actors with unique roles and responsibilities. All actors play important roles in the compliance process. With the triennial update cycle of the Standards, there is constant need for updated information dissemination, training, and education for both the Mandatory and Reach Standards.

The 2011 Integrated Energy Policy Report (IEPR)[29] made the following recommendations related to Standards education and training:

- The Energy Commission, CPUC, local governments, the state's utilities, and builders should collaborate to encourage the building industry to reach these advanced energy efficiency levels in a substantial segment of the market through industry-specific training and financial incentives.
- The Energy Commission, CPUC, builders, and other stakeholders should collaborate to accomplish workforce development programs to impart the skills necessary to change building practices to accomplish ZNE in newly constructed buildings.

The Energy Commission's Building Standards Implementation Office develops material that enables the dissemination of information related to the Standards in an easy to understand format, which includes user manuals for residential and nonresidential standards, as well as online material including training videos.

The Commission's Energy Efficiency Standards Online Learning Center, which was developed for the 2008 Standards, is hosted at www.energyvideos.com. The Online Learning Center was developed with DOE funding; additional resources are needed to update it for the 2013 Standards, and sustain it over time. The online material is available 24 hours a day/7 days a week for convenient access.

The Online Learning Center provides a comprehensive educational program for the 2008 Building Energy Efficiency Standards, Title 24, Part 6 (Standards). The Online Learning Center specifically addresses the needs of enforcement agency/building department professionals to comply with the Standards; however, consumers, builders, contractors, certified energy plans examiners and others also will find the information useful. This site contains educational videos on various components of the Building Energy Efficiency Standards, including:

- Building Science (Building Envelope; Heating, Ventilation, and Air Conditioning; Water Heating; and Lighting)
- Renewable Energy
- Building Energy Efficiency Standards
- Plan Review and Inspection
- Links to the Building Energy Efficiency Standards and Other Resources

[29] http://www.energy.ca.gov/2011_energypolicy/documents/

The Online Learning Center also provides associated educational materials that provide guidance on the design and construction of efficient, durable and sustainable buildings in California, which are consistent with the Standards. The Online Learning Center is divided into subject-specific sections for ease of navigation. Each section is comprised of courses made up of lessons, educational videos, checklists and guides, plus additional links to the Standards and other related documents.

IOU Programs

The IOU Codes and Standards program in conjunction with the Workforce Education and Training Programs play a key role in addressing the workforce education and training needs related to the Standards. Education and training programs can contribute to improvement in compliance rates by generating awareness and improving understanding of the Standards, and by providing key market actors in the compliance supply chain with the tools and knowledge necessary for compliance. Education offerings are based on assessment of the needs for each planned training and its warranted merit for being funded by ratepayer dollars.

CABEC

The California Association of Building Energy Consultants (CABEC) is a non-profit organization that was founded in 1986 to foster professional development and ethics in the field of energy compliance through sponsorship of educational and certification programs for industry professionals on building energy efficiency. This includes the Certified Energy Analyst (CEA) and the Certified Energy Plans Examiner (CEPE) training, testing and certification programs[30]. CABEC also provides a quarterly web-based newsletter and a website, and conducts an annual statewide conference and regional meetings. These activities have been developed to assure a professional level of training, experience and qualification for those individuals preparing Title 24 compliance and energy analysis documentation.[31]

CALBO

The California Building Officials (CALBO) is a non-profit corporation promoting public health and safety in building construction through responsible legislation, education, and building code development.[32] The CALBO Education Weeks provide an opportunity to reach at one time building officials and staff from the majority of building departments in the state to deliver education and training related to the building standards.

Key Initiatives	Timeline	Initiative leads
1. IOU C&S and WE&T programs to develop and implement Sector Strategies[33] for Energy Consultants.	Q1 2013 – Q4 2014	Jill Marver (PG&E) Javier Mariscal (SCE)

[30] The CEPE is being phased out and replaced by the CEA.

[31] http://www.cabec.org

[32] http://www.calbo.org/

[33] A Sector Strategy is a program that promotes regional partnerships of employers, educators, workforce developers and other stakeholders to address the skills needs of critical industries in a region. http://www.eesectorstrategy.com/

Key Initiatives	Timeline	Initiative leads
2. IOU C&S and WE&T programs to continue delivering and developing role-based training[34] to targeted market actors that may have an impact on improving Building Energy Efficiency Standards compliance, according to priorities established by needs assessments and 2012 WE&T process evaluation recommendations.	Ongoing	Jill Marver (PG&E) Javier Mariscal (SCE)
3. IOU C&S program to coordinate with Energy Commission and CABEC to develop a more rigorous Certified Energy Analyst (CEA) Exam.	Complete	Jill Marver (PG&E) Javier Mariscal (SCE)
4. IOUs to coordinate with Energy Commission and California Association of Building Energy Consultants (CABEC) and California Building Officials (CALBO) to develop new Certified Energy Analyst (CEA) exam and related curriculum to meet the requirements of the updated Building Energy Efficiency Standards.	Q1 2013 – Q4 2013	Jill Marver (PG&E) Javier Mariscal (SCE)
5. IOU C&S, WE&T, and LGP programs to coordinate with Energy Commission to develop and deliver training to Permit/Counter Technicians at local building departments.	Q1 2013 – Q4 2014	Jill Marver (PG&E) Javier Mariscal (SCE)
6. IOU C&S and WE&T programs to collaborate with Energy Commission and industry stakeholders to provide Standards training/education to the Trades.	Q1 2013 – Q4 2014	Jill Marver (PG&E) Javier Mariscal (SCE)
7. IOU C&S program to collaborate with WE&T program to not only prepare contractors and technicians to implement Standards (such as 2013 Standards requirements for residential return duct sizing), but to also prepare the industry with installation practices training on advanced technologies that are projected to become part of future standards (such as roof deck insulation installation).	Q1 2013 – Q4 2014	Jill Marver (PG&E) Javier Mariscal (SCE)

[34] For example train building inspectors to verify permanently installed equipment (such as HVAC, water heaters, and whole-house fans) are in compliance with standards.

Key Initiatives	Timeline	Initiative leads
8. Energy Commission to collaborate with CALBO to offer Building Energy Efficiency Standards classes at the Northern and Southern California CALBO Education Weeks; and coordinate with the IOU C&S, WE&T programs and International Code Council (ICC) Chapters to offer Standards training and education to ensure consistency and accuracy of the message.	Q3 2012 - Ongoing	Pedro Gomez (Energy Commission) Jill Marver (PG&E) Javier Mariscal (SCE)
9. IOU C&S, HVAC, and WE&T programs to explore expanding the current Standards role-based training program to include an overarching integration class[35] that disseminates the same information on a topic area such as HVAC change-outs to different market actors, such as building department professionals, HVAC contractors and HERS raters among others.	Q1 2013 – Q4 2014	Jill Marver (PG&E) Javier Mariscal (SCE)
10. IOU C&S and WE&T programs to collaborate with the Energy Commission and major industry stakeholders to develop and deliver enhanced workforce education and training to ensure proper installation that would enable effective commissioning and maintenance practices.[36]	Q1 2013 – Q4 2014	Jill Marver (PG&E) Javier Mariscal (SCE) Chris Graillat (Energy Commission)
11. IOU C&S and WE&T programs to coordinate with Energy Commission to explore the option of offering online interactive training courses in order to reach a wider audience that may not have the ability to attend in person.	Q1 2013 - Ongoing	Jill Marver (PG&E) Javier Mariscal (SCE) Chris Graillat (Energy Commission)
12. IOU C&S to coordinate with the Energy Commission through participation in the IOU C&S and WE&T Curriculum Design Team when setting Standards-related training curriculum.	Ongoing	Jill Marver (PG&E) Javier Mariscal (SCE) Pedro Gomez (Energy Commission)

[35] The purpose of this training is to have consistent understanding of compliance requirements within the same jurisdiction with regard to alterations and additions among building departments, residential and nonresidential HVAC contractors, and HERS raters.

[36] Current compliant energy efficiency measures and systems including Residential and Nonresidential Lighting Design Guides; HVAC QI Code Compliance and Design Guide; and new Design Review and Commissioning requirements in 2013 Nonresidential Standards.

2.6 Key Initiatives for Planning and Coordination of Outreach for the Building Energy Efficiency Standards

Strategy 4: Expand the planning and coordination of outreach initiatives between regulatory and non-regulatory agencies and other key market actors to facilitate improvement in compliance with the Building Energy Efficiency Standards.

Coordination and outreach are seen as a key strategy for realizing the energy efficiency goals for the State. While the Energy Commission develops and the local building departments enforce the Standards, the IOU programs play a key role in educating the end-user/customer and the mid-stream contractor/installer by directly interfacing with them, as well as by working with local officials to improve their compliance processes.[37] The IOU C&S Program also provides the Energy Commission with assistance to develop compliance manuals that serve as user manuals and provide interpretative clarification of the Standards' language. It is critical that the key agencies and entities in charge of information, and the resources to deliver that information, coordinate to ensure consistency and accuracy of the messaging.

The Compliance Improvement Advisory Group (CIAG) is one such entity.[38] The CIAG is comprised of 20 practitioners representing a wide variety of professions directly involved in decisions and actions that lead to compliance with the Building Energy Efficiency Standards. It is important that the CIAG members are primarily practitioners (not trade association representatives) as their role in the advisory group is not one of advocacy for their industry. Instead, its members contribute with street-level advice on how certain compliance issues affect them, how execution of their jobs affects compliance, and how potential solutions might be made more workable, given the day-to-day activities in which they engage as practitioners.

In addition it is important to send the message to the end-user market of both the importance and benefits of compliance with state law, which requires the use of licensed contractors and pulling permits, as well as compliance with the Building Energy Efficiency Standards. The utility programs play an important role in providing this message through their incentive program requirements and outreach activities.

Licensed HVAC contractors who comply with the law by pulling permits for HVAC change-outs are often being underbid and lose work to contractors who do not pull permits. As part of the ongoing effort to create a level playing field for all contractors, the Contractors State License Board (CSLB) has instituted a "no tolerance" policy for contractors not pulling permits for HVAC change-outs. As a result, CSLB has issued more than 400 building permit citations since 2010. .

Planning and Coordination Subprogram

The IOUs' statewide C&S program is adding a new subprogram to its portfolio that supports

[37] The IOU programs have planned and ongoing activities, including, as part of the 2010-2012 portfolio cycle activities, releasing a Best Practices Guide to building departments through a statewide study conducted by Architectural Energy Corporation and funded by SCE.

[38] http://caciag.com/

coordination among key internal and external market actors. The Planning and Coordination Subprogram supports planning activities that integrate all programs across the IOU energy efficiency portfolio with C&S program activities. C&S staff will coordinate with IOU energy efficiency portfolio programs to support efforts to prepare the market for future Standards adoption (improve Standards readiness), to ensure higher compliance rates, and advance the Strategic Plan goals for achieving zero net energy.

This subprogram will consist of four elements: 1) Strategic planning and coordination; 2) Outreach within each IOU to other program areas; 3) Statewide planning and coordination; and, 4) Workforce education and training. Among the activities for 2013-2014, the subprogram commits to establishing a Codes and Standards Collaborative that maintains coordination to conduct integrated strategic planning. In addition, the subprogram will establish cross-functional teams, including representatives from voluntary programs (incentive, emerging technologies, and education and training), the CPUC, and the Energy Commission, to identify Standards readiness priorities relative to policy goals, for example: zero net energy, Assembly Bill (AB) 1109, and other Action Plan objectives.

Reach Standards Subprogram

The IOUs' statewide C&S program includes a Reach Codes subprogram that provides technical support to local governments to adopt local ordinances that exceed the Building Energy Efficiency Standards' requirements for newly constructed buildings, additions, and alterations. Support for local governments includes research and analysis for establishing Reach Standards performance levels beyond the Mandatory Building Energy Efficiency Standards and determining cost effectiveness for each climate zone, drafting of model local ordinance templates for regional consistency, and assistance for completing and expediting the application process required for approval by the Energy Commission. The subprogram also supports local governments that seek to establish residential or nonresidential energy conservation ordinances for upgrading existing buildings. Among the program activities, the program staff facilitates public workshops and presentations to interested stakeholders including elected officials, city/county staff, industry organizations, and community groups that address the following:

- The critical role that energy efficiency plays in reducing greenhouse gas emissions;
- Understanding how Reach Standards and complementary IOU New Construction incentive programs, such as California Advanced Homes and Savings By Design, help meet *CAL*Green's voluntary Tier 1 and Tier 2 energy requirements, accelerate advancement of zero net energy building practices, and mitigate project-level GHG impacts pursuant to California Environmental Quality Act (CEQA) requirements; and
- Explaining the process for developing and adopting a legally enforceable Local Ordinance, going beyond the Mandatory Building Energy Efficiency Standards, and meeting Energy Commission approval requirements.

Key Initiatives	Timeline	Initiative Leads
1. IOU C&S Team to provide technical support to Energy Commission on compliance manual sections for CASE related work.	Ongoing	Randall Higa (SCE)
2. IOU C&S and WE&T programs and Energy Commission to continue engaging with local building officials, energy professionals, and building industry stakeholders through the Compliance Improvement Advisory Group (CIAG) to shape, focus, and prioritize the compliance enhancement strategies to improve statewide Standards compliance.	Ongoing	Jill Marver (PG&E) Javier Mariscal (SCE) Pedro Gomez (Energy Commission)
3. IOU C&S Program to disseminate Building Department Best Practices Program study to all local building departments.	Ongoing	Jill Marver (PG&E) Javier Mariscal (SCE)
4. IOU C&S and WE&T programs to coordinate with the Energy Commission to explore development and dissemination of measure specific fact sheets to installers and contractors, as aids to educating their customers on energy and financial benefits of compliance with Standards.	Q1-2013 – Q4 2014	Jill Marver (PG&E) Javier Mariscal (SCE) Pedro Gomez (Energy Commission)
5. Energy Commission to collaborate with Contractors State License Board (CSLB) to encourage them to incorporate Building Energy Efficiency Standards compliance (such as HVAC, roofing, lighting) information in their newsletter and industry bulletins to their licensees.	Ongoing	Pedro Gomez (Energy Commission) Scott Weber (CSLB)
6. Energy Commission to coordinate with IOU C&S programs to conduct marketing and outreach to increase public awareness targeting building owners regarding the importance of compliance with the Building Energy Efficiency Standards and State law.	Q1 2013 – Ongoing	Pedro Gomez (Energy Commission) Jill Marver (PG&E) Javier Mariscal (SCE)
7. C&S Action Plan to coordinate with the HVAC Action Plan and with the Western HVAC Performance Alliance (WHPA) to enable the work of the following WHPA subcommittees that deal with HVAC related compliance issues: • HVAC QI/QM Committee • Marketing Committee • Compliance Committee	Q1 2013 – Ongoing	Mark Cherniack (WHPA) Pedro Gomez (Energy Commission)

2.7 Key Initiatives for Compliance Improvement and Enforcement of Building Energy Efficiency Standards

Strategy 5: Support efforts toward compliance improvement and enforcement with the Building Energy Efficiency Standards, both Mandatory and Reach Standards

Compliance with the Standards is essential to enable California to achieve its energy savings goals and GHG reduction mandates. Standards-compliant construction also helps ensure that California's buildings are comfortable and safe, and that energy bills are kept low. The Energy Commission works closely with the Contractor's State License Board (CSLB) and other regulatory agencies to ensure compliance with the Energy Commission's regulations and Standards.

The CSLB has the authority to license and discipline all of the general contractors (this includes builders and general contractors on construction projects) and specialty contractors (this includes specialty contractors who are completing single specialty alterations and subcontractors working under the supervision of general contractors) involved in building construction and alterations. The Energy Commission entered into a memorandum of understanding (MOU) with the CSLB to promote the CSLB's mission, which includes ensuring that construction is performed in a competent and professional manner; enforcing the laws, regulations and standards governing construction contracting in a fair and uniform manner; providing resolution to disputes that arise from construction activities; and educating consumers so that they make informed choices. The MOU establishes cooperative work agreement between the CSLB and the Energy Commission to educate the industry, consumers, and contractors, and promote common goals through education and enforcement of the Building and Appliance Energy Efficiency Standards and HERS Regulations.[39]

Compliance improvement is increasingly important to the energy efficiency industry in California. Having supported the commercialization of efficient technologies and practices through IOU incentive and rebate programs, achieving satisfactory compliance is a crucial requirement for capturing market change for the immediate and long-term benefit of ratepayers and society. Achieving consistent compliance among all contractors is necessary to level the playing field for lawful and well-intentioned suppliers and contractors, who are otherwise faced with a competitive disadvantage from contractors and unlicensed persons who unlawfully fail to comply with California contractor law and the Standards.

Compliance with state and local laws that require permits to be pulled for alterations, as specified by the local jurisdiction, is known to be low. This creates a situation where building departments are not able to enforce the Building Energy Efficiency Standards because they are unaware of the unlawful alteration projects taking place. Local building departments have no way to systematically determine when permits are not pulled, as they only have the resources to enforce building code requirements for projects that pull permits. They have no funding to patrol the streets looking for projects that may be conducted without a permit, and there is no current way to track equipment that is sold, which can only legally be installed with a permit. For example, there is a major problem when permits are not pulled for HVAC change-outs, which are required by the Standards to be done in conjunction with duct sealing and quality installation. Failure to achieve these Standards requirements for HVAC change-outs

[39] Memorandum of Understanding between State of California, California Energy Commission and the State of California, California State License Board (July 2010)

represents a potentially large utility peak demand and energy use problem, when many of the hundreds of thousands of HVAC change-outs that occur in the State each year fail to pull permits.

The Ordering Paragraphs from the CPUC's Guidance Decision on the 2013-2014 Energy Efficiency Portfolio[40] for IOU transition period programs includes the following specific language related to compliance and enforcement activities:

- No incentives for equipment requiring a building permit shall be provided any contractor or customer without that contractor or customer certifying that s/he has complied with all permit requirements and utilized a licensed contractor.
- Programs proposed by PG&E, SCE, SDG&E, and SoCalGas shall comply with Senate Bill 454 requirements, and all applicable programs shall support HVAC permit acquisition as a matter of course.
- PG&E, SCE, SDG&E, and SoCalGas shall institute the following changes to support HVAC permit acquisition in conjunction with their HVAC and Energy Upgrade California programs:
    - Energy Upgrade California jobs involving HVAC replacements must include submittal of the HVAC permit number and a contractor certification that appropriate permits have been obtained, for inclusion in program records.
    - Show in their 2013-2014 applications all programs to which the requirements above apply (and present copies of the incentive/rebate applications or other documentation) evidence that they are in full compliance with Senate Bill 454 and this decision.

Key Initiatives	Timeline	Initiative Leads
1. Energy Commission to collaborate with CSLB to educate their industry experts on the Building Energy Efficiency Standards for use when they are assigned to a complaint investigation.	Q4 2012 - Ongoing	Pedro Gomez (Energy Commission) Scott Weber (CSLB)
2. Energy Commission to collaborate with CSLB to incorporate the Building Energy Efficiency Standards requirements in the various specialty licensing exams. For example, some Standards requirements have been incorporated into the C-20, Mechanical Contractor, licensing exam.	Q4 2012 - Ongoing	Pedro Gomez (Energy Commission) Scott Weber (CSLB)
3. Energy Commission to coordinate with CSLB and provide support to them to carry out their "no tolerance" policy for contractors not pulling permits.	Q2 2012 - Ongoing	Pedro Gomez (Energy Commission) Scott Weber (CSLB)

[40] http://docs.cpuc.ca.gov/PUBLISHED/FINAL_DECISION/166830-02.htm

Key Initiatives	Timeline	Initiative Leads
4. Energy Commission to collaborate with CALBO to encourage enforcement agencies to require permits for all regulated additions and alterations (such as HVAC change-outs) to ensure compliance with the Standards.	Q1 2013 - Ongoing	Pedro Gomez (Energy Commission) Tom Garcia (CALBO)
5. IOU Incentive Programs to require contractor or customer certification that a permit has been pulled or a copy of building permit before paying rebates for HVAC installation, to ensure compliance with Standards.	Q1 2013 - Ongoing	Kevin Shore (SCG) James Tuleya (PG&E) Mugi Lukito (SCE)
6. IOU HVAC programs to explore implementing a program that requires proof of quality HVAC installation for rebate eligibility.	Q1 2013 - Ongoing	Kevin Shore (SCG) James Tuleya (PG&E) Mugi Lukito (SCE)
7. Energy Commission to coordinate with IOU C&S programs, WHPA, and CALBO to explore technology options to pilot on-line permitting as a method to track compliance.	Q1 2014 - Ongoing Pilot 2013 standards permitting	Pedro Gomez (Energy Commission) Tom Garcia (CALBO/WHPA) Jill Marver (PG&E) Javier Mariscal (SCE)

3 CALIFORNIA APPLIANCE ENERGY EFFICIENCY STANDARDS

3.1 Vision

The development of the Appliance Energy Efficiency Standards (Appliance Standards) is a key strategy for reducing energy use and greenhouse gas emissions for both newly constructed and existing buildings. While permanently installed equipment and appliances are a substantial part of the building's energy use, consumer electronics, computers and other devices plugged into outlets (plug loads) make up a growing portion of California's energy use. Unfortunately, the energy use (and thus the true cost) of appliances and electronic devices is often invisible to the consumers. Therefore manufacturers often lack the direct incentive to redesign products to use energy more efficiently as they do not pay for the energy their products consume, and their customers do not create strong market demand.

Vision

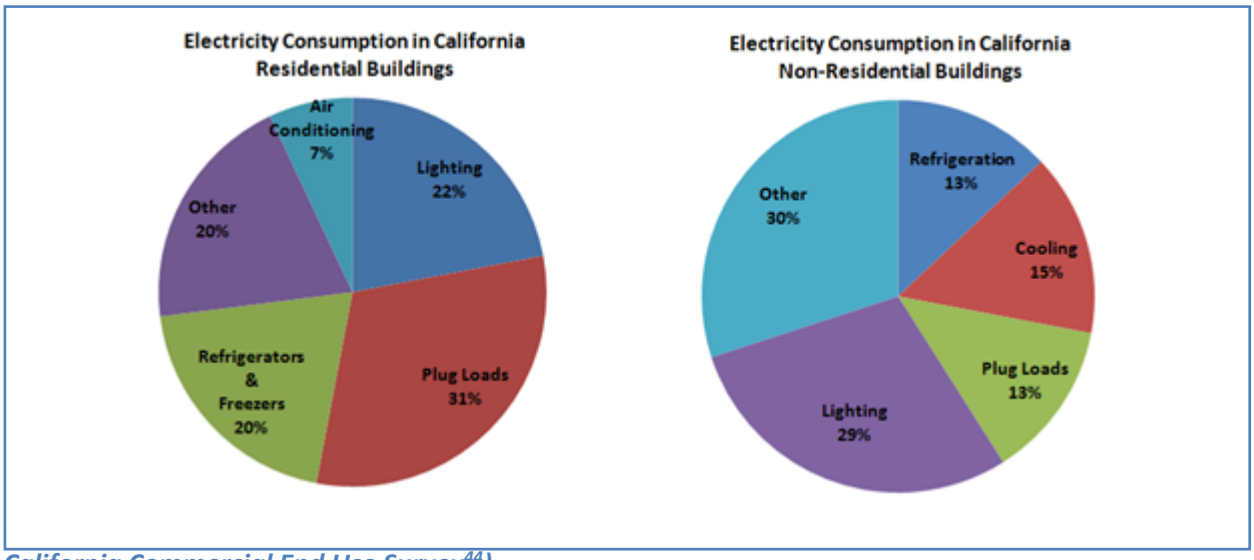
By 2016, wide-spread efficiency improvements in the consumer appliance and commercial equipment industry—spurred by standards development and consumer driven preferences—will yield highly performing appliances and equipment that transform the market for these products and help achieve California's Zero Net Energy goals.

The Energy Commission's Appliance Standards Program addresses this issue by setting cost-effective efficiency requirements for appliances, equipment, and electronic and other devices. These efficiency standards transform the market by only allowing efficient products to be sold in California. Since 1976, the Energy Commission has adopted standards covering a wide range of appliances, including all major household appliances, air conditioners, furnaces, and water heaters. In many instances, California standards have subsequently been adopted as national standards by the United States Congress and Department of Energy (U.S. DOE).

The Energy Commission is contributing to the ZNE goals by regularly updating its appliance standards, including standards for electronic equipment and devices, such as TVs and battery charger systems, and other devices plugged into electrical outlets, which represent an ever increasing portion of California's energy use. In 2010, Appliance Standards alone saved an estimated 19,684 gigawatt hours of electricity[41], representing nearly 7 percent of California's electric load, and saved consumers about $2.6 billion in energy costs. As seen in the pie charts below, the appliance related electricity consumption including plug loads is a major portion of both residential and nonresidential buildings (almost 50 percent for residential major appliances, such as refrigerators and dryers, and plug loads). [42]

[41] California Energy Demand 2012-2022 Final Forecast, Page 70, http://www.energy.ca.gov/2012publications/CEC-200-2012-001/CEC-200-2012-001-SF-V1.pdf

[42] California Energy Commission, 2011. 2011 Integrated Energy Policy Report. Publication Number: CEC-100-2011-001-LCF. http://www.energy.ca.gov/2011publications/CEC-100-2011-001/CEC-100-2011-001-CMF.pdf



California Commercial End Use Survey[44])

The California Energy Commission will pursue the following approaches in developing Appliance Energy Efficiency Standards:

- Develop, adopt, and implement new appliance standards that reduce energy use from plug loads and water consumption, and that result in high performance buildings.
- Develop enforcement regulations to implement the fine and citation authority established by SB 454 (Pavley, 2011) to ensure that efficiency gains from appliance standards are fully realized.
- Conduct technology, compliance, and market characterization research to guide the development of advanced appliance energy efficiency standards and their enforcement.
- Coordinate stakeholders pursuing market transformation[45] efforts, such as utility incentives and rebates, the EPA Energy Star Program, as well as with manufacturers, to advance the development, recognition, and adoption of new energy efficient appliance technologies.

In addition, The 2011 Integrated Energy Policy Report (IEPR)[46] lists the following recommendations for the Appliance Energy Efficiency Standards which are common goals of the strategic plan:

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[43] http://www.energy.ca.gov/appliances/rass/

[44] http://www.energy.ca.gov/ceus/

[45] Market transformation is long-lasting, sustainable changes in the structure or functioning of a market achieved by reducing barriers to the adoption of energy efficiency measures to the point where continuation of the same publicly-funded intervention is no longer appropriate in that specific market. Market transformation includes promoting one set of efficient technologies, processes or building design approaches until they are adopted into codes and standards (or otherwise substantially adopted by the market), while also moving forward to bring the next generation of even more efficient technologies, processes or design solutions to the market. D0909047 p. 88-89

[46] California Energy Commission, 2011 Integrated Energy Policy Report. Publication Number: CEC-100-2011-001-LCF. http://www.energy.ca.gov/2011publications/CEC-100-2011-001/CEC-100-2011-001-CMF.pdf

- The Energy Commission should adopt appliance standards that focus on reducing plug loads to enable California's ZNE goals to be achieved.
- The Energy Commission should continue to adopt standards for appliances that represent the most significant statewide energy savings potential.
- The Energy Commission and CPUC should collaborate on research to identify the most cost-effective opportunities for new appliance standards and to reevaluate existing standards to identify the most cost-effective opportunities for updates to achieve greater energy savings.
- The Energy Commission and CPUC, in collaboration with utilities and other stakeholders, should jointly develop a roadmap to meet the lighting energy savings mandated by AB 1109, including new appliance and building efficiency standards and market transformation programs to achieve higher levels of energy efficiency than required by standards.
- The Energy Commission should collaborate with industry to develop Reach Standards for appliances that set higher expectations in California for the quality and performance of key appliances.
- The Energy Commission and CPUC to continue their collaboration on voluntary light emitting diode (LED) quality performance specifications.
- The Energy Commission should engage in DOE proceedings that are developing federal test methods and appliance standards.
- The Energy Commission and CPUC should emphasize joint efforts to achieve improved compliance with the Building Energy Efficiency and Appliance Standards.

3.2 Key Strategies

Strategy 1: Develop progressive initiatives to enable market transformation toward highly efficient appliances.

Strategy 2: Expand the coordination of appliance efficiency initiatives among regulatory and non-governmental agencies, associations and industry leads to facilitate the development and adoption of high performance and efficient appliances.

Strategy 3: Enable higher compliance with Appliance Standards and more effective enforcement actions.

3.3 Key Initiatives for Advancement of California's Appliance Standards

Strategy 1: Develop progressive initiatives to enable market transformation toward highly efficient appliances.

Policy Drivers for Advancement of Appliance Standards

The Warren-Alquist Act authorizes the Energy Commission to adopt minimum operating efficiency standards for appliances that use a significant amount of energy and water on a statewide basis. Such standards must be feasible, attainable, and cost effective for consumers, in that they "shall not result in any added total cost to the consumer over the designed life of the appliances." Also, Governor Brown's 2010 Clean Energy Jobs Plan (2010)[47] calls for adopting stronger appliance standards for lighting, consumer electronics, and other products.

The Commission's Appliance Energy Efficiency Standards program is also important for meeting the following legislative mandates and energy policy goals:

- Assembly Bill 1109 (Huffman, 2007) requires the Energy Commission to adopt minimum energy efficiency standards for all general purpose lights, and to reduce average statewide electrical energy consumption by not less than 50% from the 2007 levels for indoor residential lighting, and not less than 25% from the 2007 levels for indoor commercial and outdoor lighting by 2018.
- Assembly Bill 662 (Ruskin, 2007) requires the Energy Commission to adopt standards for water-efficient appliances whose use, as determined by the Energy Commission, requires a significant amount of energy or water on a statewide basis.
- California's ZNE goals that all newly constructed residential buildings will be ZNE by 2020 and all newly constructed commercial buildings will be ZNE by 2030.
- ARB's Scoping Plan that delineates strategies for meeting Assembly Bill 32 (Núñez, 2006) includes maximizing building and appliance energy efficiency standards.

Order Instituting Rulemaking (OIR)

In March 2012, the Energy Commission instituted a rulemaking proceeding to consider establishing efficiency standards, test procedures, marking and labeling requirements, and other regulations for multiple appliances, which consume a significant amount of energy or water on a statewide basis. The ultimate goal of this rulemaking proceeding is the reduction of excessive energy and water consumption by regulated appliances in the state.

The rulemaking proceeding will be divided into three phases as shown in Table 1 below. Phase 1 implementation began early 2013. Energy Commission staff will draft Staff Reports using data generally available and provided by stakeholders to support mandatory cost effectiveness and technical feasibility of improved energy or water efficiency. These draft Staff Reports will also include potential additions

[47] http://www.jerrybrown.org/sites/default/files/6-15%20Clean_Energy%20Plan.pdf

and changes to the current appliance energy efficiency regulations.

Public workshops will be held to solicit comments on draft regulations. The draft Staff Reports will be revised based on oral feedback at the workshops and written comments. After additional consultation with Commissioners, and revision, staff will formally publish proposed regulations for a 45-day public review and comment period. The Energy Commission will hold a public hearing during this period to vet the proposed regulations. After additional revisions, the proposed regulations will be considered for adoption by the Energy Commission. With completion of the adoption of the proposed regulations for Phase 1 appliances, the process will be repeated for Phase 2 and Phase 3. Each phase is expected to take about a year to complete.

Table 1: Appliance Phased Rulemaking Schedule

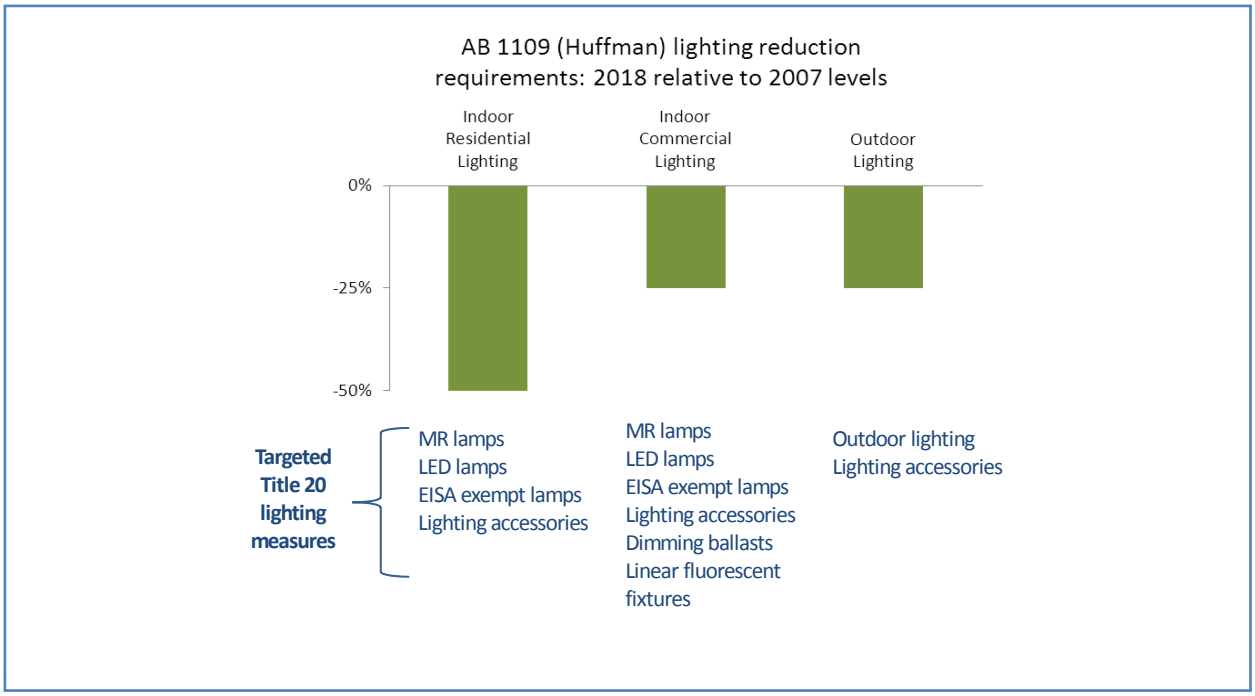
Topic	Phase 1:	Phase 2:	Phase 3:
Consumer Electronics	Displays; Video game consoles; Computers; Set-top boxes; Network Equipment	Servers; Imaging equipment	Low power modes; Power factor
Lighting	Dimming ballasts; Multi-faceted reflector (MR) lamps; Light-emitting diode (LED) lamps	Lamps exempted by the federal Energy Independence and Security Act ; Lighting accessories; Outdoor lighting	Linear fluorescent fixtures
Water and Other	Commercial clothes dryers; Toilets and urinals; Air filter labeling; Faucets; pool pump motors; Electric spas; Water meters	Plug-in luminous signs; Irrigation equipment	Commercial dishwashers; Recirculation pumps; Refrigeration condensing units

AB 1109 (Huffman, 2007) Lighting Efficiency

Energy consumption for lighting accounts for nearly 20 percent of the state's electricity demand. AB 1109 requires that average statewide lighting energy consumption in 2018 be reduced by the following amounts:

- Indoor residential lighting not less than 50 percent from 2007 levels
- Indoor commercial lighting not less than 25 percent from 2007 levels
- Outdoor lighting not less than 25 percent from 2007 levels

Transitioning to currently available, higher efficiency lighting technologies will substantially reduce energy consumption and greenhouse gas emissions and lower costs to consumers. The legislation calls for the Energy Commission to adopt appliance energy efficiency standards and other programs to reduce average statewide electrical energy consumption to meet AB 1109 requirements.



The Energy Commission's Research and Development Division is funding a studies to establish the statewide 2007 baseline lighting consumption against which progress to meet the AB 1109 mandated savings by 2018 will be measured. Additionally, a roadmap will need to be established to guide how to meet the AB 1109 mandated savings effectively and on time. CPUC and Energy Commission staff will collaborate on developing a road map for achieving AB 1109 goals in consultation with utility partners and other interested parties.

The separate Lighting Action Plan[48] completed in 2011 also addresses lighting strategies, but those specifically relevant to Codes and Standards are highlighted in this Action Plan. The Lighting Action Plan calls for a 60-80% reduction in statewide lighting energy consumption by 2020 from a 2010 baseline; work related to the Lighting Action Plan will quantify a 2010 lighting baseline consumption estimate.[49]

Codes and Standards Enhancement (CASE) Studies

The IOU C&S Programs are already collecting and analyzing data to support the development of CASE studies related to the Phase 1 OIR lighting topics including: LED lamps; Small Diameter Directional Lamps; and Dimming Fluorescent Lamp Ballasts. The CASE studies include market research and product testing, cost effectiveness and technical feasibility analysis, and draft efficiency standards proposals.

Plug Loads

Despite the success to date of appliance energy efficiency standards, the amount of energy consumed by "plug loads" continues to climb rapidly. To address these growing plug loads, the Energy Commission

[48] http://www.cpuc.ca.gov/NR/rdonlyres/1E859DC3-4563-460C-B1A6-E0CAAF04CB0C/0/LightingActionPlanFinal_June2011.pdf

[49] The CPUC tasked Navigant Consulting, Inc. with estimating this number and will share the method with the Energy Commission and CLTC.

has initiated and completed several rulemaking proceedings for Standards covering products, such as televisions (TVs), external power supplies (EPS), DVD players, and compact audio devices. These regulations established minimum efficiency or maximum power use requirements for more than 27 million units sold per year (TVs: 4 million per year, EPS: 20.6 million per year, DVDs: 1.5 million per year, compact audio devices: 1.1 million per year). The Energy Commission also has adopted standards for the estimated 58 million battery chargers sold in California per year.[50] The estimated energy savings for these battery charger standards is 2,000 GWh per year; 1,600 GWh will result from reduced residential plug load and 400 GWh will result from reduced commercial plug load. The battery charger standards will improve the efficiency of a wide range of plug loads, such as laptop computers, power tools, electric toothbrushes, cell phones, mp3 players, and golf carts.[51]

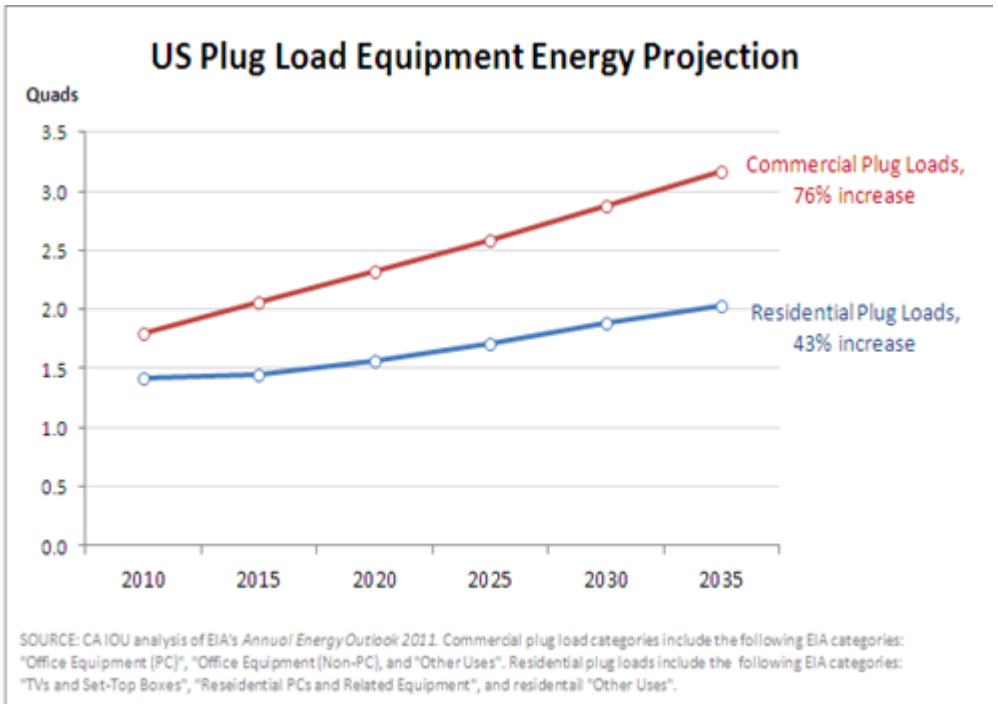
Figure 6 below shows the rapid increase in the growth of plug loads nationwide projected over time. Plug loads are an ever increasing percentage of the electricity consumption in both residential and nonresidential buildings. As the Building Standards are improved in upcoming upgrade cycles, the building energy use for heating, air conditioning, water heating and lighting will go down, but plug loads will become an increasing percentage of the remaining energy to be met by onsite renewables to reach ZNE goals.

A comprehensive plug load characterization study[52] is needed to facilitate a more informed discussion regarding which appliances should be targeted for standards, emphasizing first developing standards that would not be preempted by federal law. This study should distinguish between plug loads that are good candidates for California Appliance Standards and those plug loads that would be impractical to regulate, due to lack of data or energy savings opportunities, or large variability in use patterns. This will allow the Energy Commission and the CPUC to focus both on mandatory standards for specific plug loads, and education and outreach to address the remainder of the plug load growth.

[50] M. Brook, B. Chrisman, P. David, T. Ealey, D. Eden, K. Moore, K. Rider, P. Strait, G. D. Taylor, and J. Wu. July 2011. Draft Staff Report: Achieving Energy Savings in California Buildings (11-IEP-1F). California Energy Commission, Efficiency and Renewables Division. Publication number: CEC-400-2011-007-SD.

[51] IEPR 2011

[52] This study should address portable task lighting, which is difficult to effectively cover in the Building Energy Efficiency Standards.



Reach Standards

The Energy Commission should explore the use of Reach Standards for appliances, similar to the Reach Standards for buildings that have been developed through the Energy Commission's Building Energy Efficiency Standards efforts. Implementation of Reach Standards would facilitate market transformation for federally pre-empted appliances through rebate and incentive programs, and promote efficiency beyond California mandatory Appliance Standards.

The Energy Commission has developed quality specifications for LED lamps, which manufacturers can voluntarily meet to distinguish themselves in the market and qualify for utility incentives. The Energy Commission approved the proposed Specifications on December 12, 2012.

The Energy Commission also will collaborate with the IOUs and key market actors to explore the creation of a verification program for appliances that voluntarily meet higher efficiency, Reach Standards. Such Reach Standards can be the basis for utility incentive programs that provide market transformation pull for high performing appliances.

Key Initiatives	Timeline	Initiative Lead

Key Initiatives	Timeline	Initiative Lead
1. Energy Commission to complete the study establishing the lighting energy usage baseline for 2007 as needed for achievement of AB 1109 mandates.	Q3 2012 – Q2 2014	Harinder Singh (Energy Commission)
2. Energy Commission and CPUC to collaborate with IOUs (Lighting Market Transformation Program and C&S Program) and lighting industry to develop a roadmap for achieving AB 1109 targets (Codes and Standards and voluntary energy efficiency programs).	Q1 2013 – Q4 2013	Harinder Singh (Energy Commission Jeorge Tagnipes (Energy Division CPUC Virek Ly (SCE) Pat Eilert (PG&E)
3. IOUs to coordinate with Energy Commission to develop CASE studies related to the topic areas in Phase 1 of the OIR.	Q1 2013 – Q4 2014	Pat Eilert (PG&E) Randall Higa (SCE)
4. IOUs to participate in the Energy Commission public process for standards adoption to update CASE reports as needed.	Q1 2013 – Q4 2015	Pat Eilert (PG&E) Randall Higa (SCE)
5. IOU C&S to coordinate with Energy Commission , ETP and IOU Incentive and EM&V Programs to explore and identify potential CASE studies and assessments of technologies that could be candidates for future adoption into Appliance Standards.	Q1 2014 – Q4 2015	Pat Eilert (PG&E) Harinder Singh (Energy Commission) Edwin Hornquist (SCE)
6. CPUC to collaborate with Energy Commission and IOUs to conduct a comprehensive statewide plug load market characterization study for both residential and nonresidential end-uses.	Q1 2013 – Q4 2014	Carmen Best (Energy Division CPUC) Ken Rider (Energy Commission) Derek Jones (PG&E)
7. Energy Commission to coordinate with the IOU C&S Program and ETP to develop a roadmap that provides recommendations on potential measures that could be adopted in future Appliance Standards to achieve high reduction in plug load consumption.	Q3 2013 – Q4 2015	Harinder Singh (Energy Commission) Pat Eilert (PG&E) Edwin Hornquist (SCE)
8. Energy Commission to coordinate with IOUs and key market actors to develop energy consumption standards that apply to a range of appliances.	Q1 2014 – Q4 2015	Harinder Singh (Energy Commission) Pat Eilert (PG&E)
9. Energy Commission to complete staff report proposing voluntary quality specifications for LED lamps.	Completed	Gary Flamm (Energy Commission)

Key Initiatives	Timeline	Initiative Lead
10. IOUs to explore developing incentive and rebate programs based on voluntary Reach Standards developed by the Energy Commission to increase market penetration of high efficiency appliances.	Q1 2015 – Q4 2016	Harinder Singh (Energy Commission)Pat Eilert (PG&E) Randall Higa (SCE)

3.4 Key Initiatives for Coordination and Outreach for Appliance Standards

Strategy 2: Expand the coordination for appliance efficiency initiatives among regulatory and non-governmental agencies, associations, and industry leads to facilitate the development and adoption of high performance and efficient appliances.

Engagement in Federal Appliance Standards Adoption and Coordination with Energy Star Programs

The United States Congress adopts legislation that establishes federal appliance energy efficiency standards in statute and directs the U.S. Department of Energy (DOE) to periodically update those standards. These federal standards preempt the ability of the Energy Commission to adopt or update California Appliance Standards for products that are covered by the federal standards. The Energy Commission develops and adopts standards for appliances that are outside the scope of federal standards and regulations to ensure that appliances offered for sale in California are in compliance with federal and California Appliance Standards.

Active engagement in federal appliance standards adoption is critical. This includes involvement in Congressional actions to develop and amend federal statutes related to appliance standards, and intervention in DOE rulemakings to adopt and update federal standards by regulation. Currently, DOE is considering the adoption of federal standards for battery charger systems. DOE has proposed the adoption of standards that are substantially less stringent than those recently adopted by the Energy Commission in January 2012. If these federal standards are adopted, California consumers will fail to realize the energy and cost savings and greenhouse gas emission reductions anticipated by the California standards.

California standards for HVAC equipment, freezers refrigerators, and other federally covered appliances are preempted by federal law. The Energy Commission and the IOU C&S Program tracks DOE standards and test procedures, and coordinates with other national and state energy efficiency advocate groups to file intervener comments to rulemaking proceedings and national negotiations to promote the most stringent federal appliance standards and to mitigate federal preemption. Also, a coalition of California, Pacific Northwest, and Southwest utilities and regulators advocate for amendments to federal standards for HVAC equipment that recognize the value of regional standards to match climatic needs.

Also, DOE and the United States Environmental Protection Agency (EPA) are in charge of managing the voluntary national Energy Star program. The Energy Commission and the IOU C&S Program coordinates with the Energy Star Program in establishing California Appliance Standards, and Reach Standards and beyond Standards incentives.

Statewide Coordination

Collaboration and coordination has been a consistent theme of the State policy directives and cited as important in the CPUC's Guidance Decision for the 2013-2014 Energy Efficiency Portfolio,[53] the Strategic Plan and the IEPR.

[53] http://docs.cpuc.ca.gov/PUBLISHED/FINAL_DECISION/166830-02.htm

One coordination effort is the Statewide Lighting and Codes & Standards roundtables, which addresses the 2011 Strategic Plan's call to reduce California's energy use to light the built environment and achieve a 60-80 percent reduction in statewide electrical lighting consumption by 2020 compared to a 2010 baseline. The roundtables bring together utility and state agency representatives to identify partnerships and strategies to support IOUs' work in emerging technologies, codes and standards, and rebate programs aimed at meeting the efficiency goals of AB 32, AB 1109 and the Strategic Plan. Members of the roundtables exchange updates on the Appliance Energy Efficiency Standards revision process and also plan to update the next (2016) Building Energy Efficiency Standards. They serve to provide coordination between the Energy Commission and CPUC.

The 2013-2014 IOU program cycle should focus on the coordination between C&S programs and other IOU programs. This effort should involve coordination of research efforts and sharing of research results for mutual benefit. For example, the issue of Plug Loads is multi-faceted and requires coordination among the Energy Commission, the CPUC, IOUs, and other market actors. A periodic (possibly biennial) Plug Loads Summit could facilitate the exchange of state of the art knowledge, current research, and initiatives.

Key Initiatives	Timeline	Initiative lead
1. Energy Commission and IOUs to coordinate advocacy at national level to influence adoption of DOE standards that are at least as stringent as California standards, and are the most stringent that are technically feasible and cost effective.	Ongoing	Kristen Driskell (Energy Commission) Pat Eilert (PG&E)
2. WHPA to coordinate with key stakeholders to form a regional coalition (CA, PNW, AZ, and Nevada, and southwestern utilities and regulators) to address the amendment of federal standards to strengthen regional standards for HVAC equipment and mitigate federal preemption.	Q1 2013 – Q4 2015	Mark Cherniack (WHPA) Pat Eilert (PG&E)
3. IOUs ETP Program to coordinate with the IOU C&S Program to provide technology development specifications to manufacturers that lead to the production of high efficiency appliances.	Q1 2013 - ongoing	Edwin Hornquist (SCE) Randall Higa (SCE)
4. IOUs to collaborate with Energy Commission and CPUC to organize a Statewide Plug Loads Roundtable in conjunction with key stakeholders.[54]	Q1 2013 – ongoing	Randall Higa (SCE) Edwin Hornquist (SCE) G.P. Li (UCI Plug Load Center)

[54] Plug Load groups operating under the Research and Technology and Commercial ZNE Action Plan and other industry actors.

3.5 Key Initiatives for Compliance With and Enforcement of Appliance Standards

Strategy 3: Enable higher compliance with Appliance Standards and regulations

The Appliance efficiency standards deliver cost-effective energy savings to consumers. They are a critical part of the state's policies and efforts to manage energy consumption, conserve natural resources, reduce the impact of climate change, and improve the quality of life for all its citizens. The Governor and Legislature recognize that an excessive number of appliances are sold and offered for sale in California that do not meet the state's energy efficiency standards. These products needlessly waste energy and water resources. Failure to meet legal requirements for certification of appliances sold in California undermines the state's ability to ensure these products meet the state's efficiency standards.

These violations result in a substantial financial loss to consumers who purchase energy efficiency goods and services, and represent unfair competition that harms the economic viability of legitimate, lawful businesses. It is critical for California to maintain a business climate favorable to legitimate competition, so that conscientious contractors, manufacturers, distributors, retailers, HERS raters, and other businesses are able to sustain their businesses against unfair competition.

On October 8, 2011, Governor Brown signed SB 454 (Pavely),[55] which provides the Energy Commission with the authority to issue citations and fines for violations of the Appliance Energy Efficiency Regulations. The legislative intent is to ensure: 1) legitimate and lawful businesses involved in the supply chain for appliances covered by the Appliance Standards are able to operate in a fair and favorable business climate, and 2) regulated appliances sold in California demonstrate that they meet the state's energy efficiency standards through the Energy Commission's certification program.

Enforcement

The Energy Commission will develop regulations to improve compliance with appliance efficiency standards using its authority under SB 454, which authorizes the Energy Commission to adopt an enforcement process for addressing violations of appliance efficiency regulations and impose penalties of up to $2,500 for each violation. An order instituting rulemaking was adopted by the Commission in March 2012, and the rulemaking process will be underway in 2014.

Outreach

The bill establishes the Appliance Efficiency Enforcement Subaccount within the Energy Resources Program Account, where penalty funds will be deposited. These funds may be spent upon appropriation by the Legislature for public education and enforcement of the appliance efficiency standards. The Energy Commission will need to develop a public outreach and education program that maximizes the effectiveness of these penalties and minimizes statewide energy and water consumption.

Appliance Database

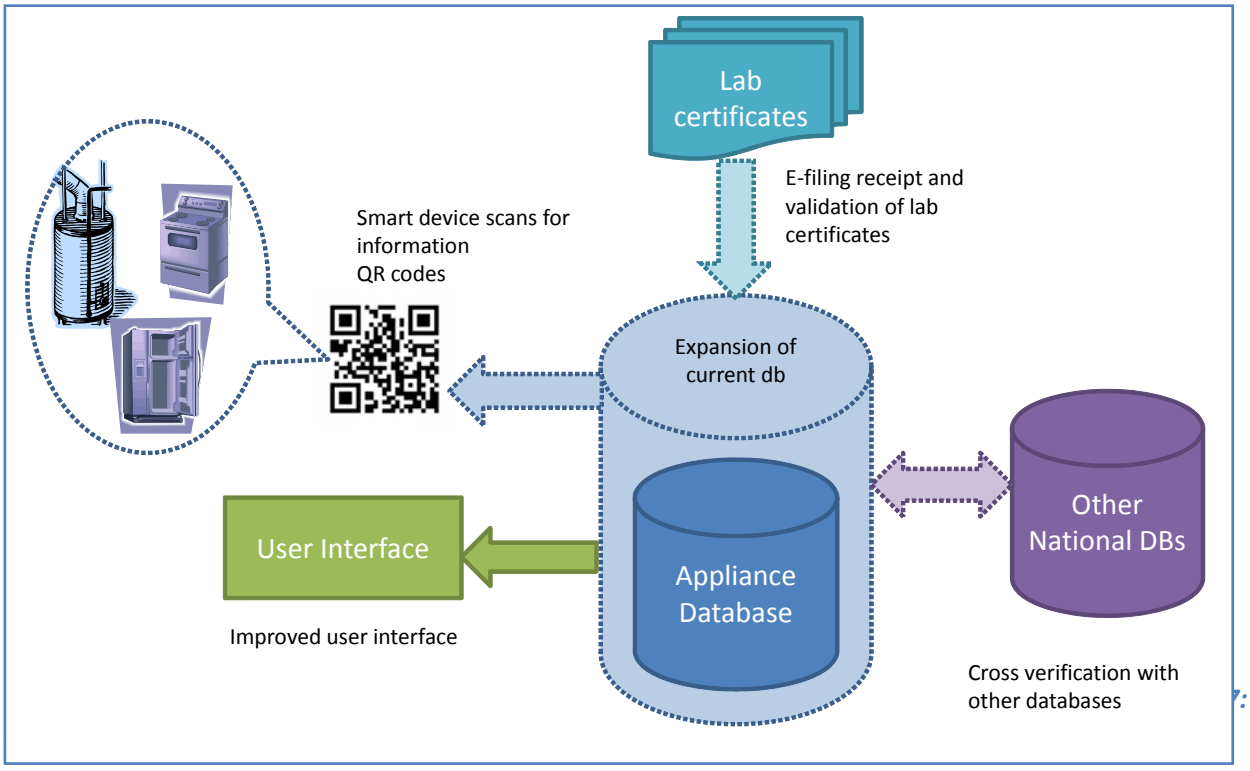
The Energy Commission is pursuing an Appliance Standards Database Modernization project to establish

[55] SB 454 mandates listed in the Appendix C

integrated online and automated submittal and validation of appliance certification and test lab approval forms, and drastically improve both the processes used by manufacturers to submit appliance data and the ability of consumers to effectively explore, find, and compare information describing the energy efficiency of appliances offered for sale in California.

The modernized database system will include:

- Electronic filing, receipt and validation of certified appliance data and related approvals
- Improved end-user interface with interactive capability
- Communication capability with other national and industry databases for cross verification
- Ability to serves data to smart devices for in-field verification
- Ability to track compliance related failures for potential follow-up



Key Initiatives	Timeline	Initiative Lead
1. Energy Commission to complete modernization of the appliances database to streamline compliance with and enhance enforcement of the Appliance Standards and regulations.	Q1 2013 – Q4 2015	Peter Strait (Energy Commission)
2. IOUs C&S Program to collaborate with Energy Commission and CPUC to analyze findings from recent studies in order to establish compliance rate baselines (2013) for state and federally regulated appliances being sold or offered for sale in California.	Q1 2013 – Q4 2014	Derek Jones (PG&E) Pat Eilert (PG&E) Lance DeLaura (Sempra) Carmen Best (Energy Division CPUC) Maunee Berenstein (Energy Commission)
3. Energy Commission to develop and adopt administrative process for citation and penalty authority for noncompliance with standards provided by SB 454.	Q3 2012 – Q4 2013	Energy Commission
4. Energy Commission to coordinate with IOUs to provide outreach and education throughout the state to consumers, retailers, and industry groups, on the Appliance Efficiency Program and the benefits of energy efficiency.	Q1 2014 – Ongoing	Energy Commission Jill Marver (PG&E) Javier Mariscal (SCE)
5. Energy Commission to explore options for expanding appliance testing capabilities to support enforcement.	Q1 2013 – Q4 2013	Maunee Berenstein (Energy Commission)

Appendix A - Collaborators for the Development of Codes and Standards Action Plan[56]

Collaboration Meetings

Name	Affiliation
Bill Pennington	CEC - Efficiency and Renewable Energy Deputy Division Chief
Bruce Helft	CEC - Staff - Appliance Standards
Chris Olivera	CEC - Staff – Building Standards Compliance
Consuelo Martinez	CEC - Office Manager - Appliance Standards
Craig Hoellwarth	CEC - Supervisor – High Performance Buildings
Dave Ware	CEC - Staff – Building Standards Development
Eurlyne Geiszler	CEC - Office Manager - High Performance Buildings and Standards Development
Gary Flamm	CEC - Supervisor – Building Standards Development
Jim Holland	CEC - Staff – Building Standards Compliance
Ken Rider	CEC - Staff - Appliance Standards
Martha Brook	CEC - Senior Mechanical Engineer – High Performance Buildings and Standards Development
Mazi Shirakh	CEC - Senior Mechanical Engineer – High Performance Buildings and Standards Development
Megan Cordes	CEC - Staff – High Performance Buildings
Patrick Saxton	CEC - Senior Electrical Engineer – High Performance Buildings and Standards Development
Paula David	CEC - Supervisor - Appliance Standards
Pedro Gomez	CEC - Office Manager - Standards Implementation
Peter Strait	CEC - Staff - Appliance Standards
Ayat Osman	CPUC –Senior Analyst - Energy Division - Codes & Standards Action Plan Lead
Ken Keating	Consultant - ED/CPUC - Codes & Standards EM&V Plan
Paula Gruendling	CPUC – Staff - Energy Division
Smita Gupta	Itron – Consultant - ED/CPUC - Codes & Standards Action Plan
Pat Eilert	PG&E – Lead - Statewide C&S Program
Gary Fernstrom	PG&E – Staff - Statewide C&S Program
Jill Marver	PG&E – Staff - Statewide C&S Program
Stu Tartaglia	PG&E – Staff - Statewide C&S Program
Randall Higa	SCE – Lead - Statewide C&S Program
Javier Mariscal	SCE – Staff - Statewide C&S Program
Ron Gorman	Sempra – Lead - Statewide C&S Program
Alex Chase	Energy Solutions – Consultant - IOU C&S Program
Jon McHugh	McHugh Energy – Consultant - IOU C&S Program

[56] Multiple meetings were held between the participants over 2011 and 2012 to develop this Action Plan.

Appendix B - Participants for the Roundtable for Codes and Standards Action Plan

Jun 29, 2012[57]

Name	Affiliation
Bill Pennington	CEC – Efficiency and Renewable Energy Deputy Division Chief
Eurlyne Geiszler	CEC - Office Manager - High Performance Buildings and Standards Development
Martha Brook	CEC - Senior Mechanical Engineer – High Performance Buildings and Standards Development
Bruce Helft	CEC - Staff - Appliance Standards
Peter Strait	CEC - Staff - Appliance Standards
Vanessa Byrd	CEC - Supervisor – Building Standards Education and Outreach
Ayat Osman	CPUC – Senior Analyst - Energy Division - Codes & Standards Action Plan Lead
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Mike Hodgson	ConSol – Energy Consultant – California Building Industry Association
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Abdullah Ahmed	Sempra – Staff - Statewide C&S Program Lead
Adrian Salas	Sempra – Staff - Statewide C&S Program Lead
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Kristin Heinemeier	Western Cooling Energy Center
Bob Wiseman	Western HVAC Performance Alliance
Susie Evans	Western HVAC Performance Alliance
Bruce Wilcox	Wilcox Consulting – Consultant – California Energy Commission

[57] The Roundtable was held at Energy Commission on June 29, 2012 and the participants provided both verbal and written feedback on the Action Plan.

*Mallory Taub**	*Arup – Consultant – California Energy Commission*
*Cathy Fogel**	*CPUC – Staff - Energy Division*
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*Ronald Gorman**	*Sempra – Lead - Statewide C&S Program Lead*

**Online participants*

Appendix C – Additional background and information

Relevant Policy Context

A number of policy documents and legislation establish the policy framework for the update and improvement of Building Energy Efficiency Standards and Appliance Energy Efficiency Standards. Appendix C includes a brief background on critical policy guidance.

Building and Appliance Energy Efficiency Standards implement the following state energy policy directives

- The 2003 Energy Action Plan[58] (EAP) established California's "loading order" policy for prioritizing energy resources to address the State's growing energy demands. Energy efficiency is the highest priority in the loading order, along with demand response, followed by electricity generation from renewable energy resources.
- The Energy Commission's biannual Integrated Energy Policy Report[59] (IEPR) continues to emphasize the role of building energy efficiency in meeting California's energy policies and climate change mandates to achieve greenhouse gas (GHG) emission reductions. Energy efficiency is identified as the first strategy for accomplishing GHG reduction targets because it is the least cost, most environmentally sensitive and expeditious approach to reduce the contribution to climate change in the building sector, which is second only to on-road vehicles in statewide GHG emissions. The IEPR recommends that a statewide efficiency target be set at 100 percent of economic potential. The report concludes that for the Standards to reach the aggressive goals in the state's energy and climate change policy reports and initiatives, and the GHG emission reduction mandates in legislation, vigorous energy efficiency coupled with technologies like solar photovoltaic systems will have to be accomplished.
- The 2007 Integrated Energy Policy Report[60] (IEPR) established the goal that Building Energy Efficiency Standards achieve zero net energy levels by 2020 for newly constructed residential buildings and by 2030 for newly constructed commercial buildings. A zero net energy building is a highly energy efficient building that is combined with onsite renewable electric generation systems to consume zero or less energy on an annual basis. The Energy Commission conducts a tiered approach to achieve zero net energy in future building standards. The base of this approach is the traditional mandatory Standards that increase in stringency with every three-year update cycle. Above those Mandatory Standards are voluntary “Reach Standards” for advanced levels of energy efficiency. The intent of the advanced, voluntary Reach Standards tiers is to provide the industry and marketplace with a criteria for differentiating highly energy-efficient buildings from standard buildings, and to pilot enhanced energy efficiency features needed to meet the Reach Standards in the field to see how well they work before determining how these measures should be included in future mandatory standards. The 2013 Standards is the first standards update cycle where both mandatory and reach levels of standards are adopted by the Energy Commission in parallel.

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[58] http://www.energy.ca.gov/energy_action_plan/

[59] http://www.energy.ca.gov/energypolicy/index.html

[60] http://www.energy.ca.gov/2007_energypolicy/index.html

- A 2005 Governor's Executive Order and 2006 statute establish landmark greenhouse gas emission (GHG) reduction goals and mandates for California. The Climate Action Initiative (Executive Order S-3-05, June 2005) set the following GHG emission reduction targets for California: by 2020, reduce GHG emissions to 1990 levels, and by 2050, reduce GHG emissions to 80 percent below 1990 levels. The Global Warming Solutions Act of 2006[61] (Assembly Bill 32, Núñez, 2006, AB 32) codified the 2020 GHG emission reduction target into law. Effective Building and Appliance Energy Efficiency Standards are critical for the state to achieve its GHG mandates and goals.
- In 2006 SB 1[62] (Murray) directed the Energy Commission to establish state policy, and conduct programs to marry energy efficiency and renewable energy at the building site. The Energy Commission was directed to develop standards to ensure high performing solar homes – homes that have energy efficiency levels higher than required by mandatory building standards, coupled with well designed, well installed, efficient photovoltaic systems. The Commission established Reach Standards for energy efficiency beyond that required by the mandatory Building Energy Efficiency Standards as a condition for newly constructed residential and nonresidential buildings to qualify for solar electric system incentives. SB 1 separately required the Energy Commission to determine whether, and under what conditions, solar energy electric generation systems should be required on through the Building Energy Efficiency Standards on newly constructed buildings. The bill required that the Energy Commission conduct a thorough study of the cost effectiveness of photovoltaic systems in the context of newly constructed buildings, including the economic impacts of photovoltaics on the electric generation system. All of the SB 1 work is directly related to achieving the State's ZNE goals.
- The California Green Building Standards Code (*CAL*Green, Title 24, Part 11), first published in July 2008 and updated for publication in 2010,[63] codifies voluntary "reach" standards for energy efficiency, which go beyond the mandatory Standards, for newly constructed residential and nonresidential buildings. *CAL*Green established tiered energy performance levels of 15 percent and 30 percent more stringent than the mandatory 2008 Standards. Local jurisdictions may adopt the *CAL*Green Reach Standards tiers as mandatory at the local level. Local jurisdictions may instead choose to adopt privately developed green building standards that are at least as stringent as the Building Energy Efficiency Standards and the *CAL*Green mandatory provisions. The energy provisions of these locally adopted green building standards are required to be approved by the Energy Commission to ensure that they actually are more stringent than the Standards and that the local government has adopted a cost effectiveness analysis for the green building standards through a public process. In approving these local energy and green building ordinances, the Commission seeks a written commitment on the part of the local government to actively encourage compliance with and enforce both the state mandatory standards and the energy and green building codes.
- The California Public Utility Commission's (CPUC) California Long Term Energy Efficiency Strategic Plan, dated July 2008 and updated in 2011,[64] establishes strategies for all energy efficiency programs conducted by the IOUs, local governments and third-parties that are funded through IOU ratepayer

[61] http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=200520060AB32&search_keywords=

[62] http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=200520060SB1&search_keywords=

[63] http://www.documents.dgs.ca.gov/bsc/CALGreen/2010_CA_Green_Bldg.pdf

[64] http://www.cpuc.ca.gov/NR/rdonlyres/A54B59C2-D571-440D-9477-3363726F573A/0/CAEnergyEfficiencyStrategicPlan_Jan2011.pdf

funds. The Strategic Plan calls for an ambitious Codes and Standards Program, and many other market transformation programs and initiatives, identifying areas of coordination with the C&S programs. The Strategic Plan adopts zero net energy goals for all newly constructed homes by 2020 and for all newly constructed commercial buildings by 2030. These two initiatives, along with efforts to ensure quality-installed, efficient HVAC systems and that low income customers are well served by the State's energy efficiency programs, are Big Bold Energy Efficiency Strategies that are critically important to the success of the Building and Appliance Energy Efficiency Standards to achieve California's energy policy and climate change mitigation goals and mandates.

- The ARB Climate Change Scoping Plan,[65] which was required by AB 32, identifies strategies to achieve the mandatory 2020 GHG emissions limits. Those strategies include zero net energy buildings; more stringent building and appliance energy efficiency standards; broader standards for new types of appliances and for water efficiency; improved compliance and enforcement of existing standards; and voluntary efficiency and green building standards beyond mandatory standards.
- The California Green Building Standards Code (*CAL*Green), ARB's AB 32 Climate Change Scoping Plan, and the CPUC's Energy Efficiency Strategic Plan all include the concept of a tiered approach to implementing energy efficiency in newly constructed buildings. For the 2013 Standards there is an option for a lower incentive for newly constructed residential buildings that are "compliant" with the Building Energy Efficiency Standards. A higher incentive will be available to residential buildings that incorporate additional energy efficiency measures. Assembly Bill 1109[66] (Huffman, 2007) required t*he* Energy Commission to adopt minimum energy efficiency standards for all general purpose lights by the end of 2008. The Energy Commission adopted those standards on December 3, 2008. The legislation also required the Energy Commission to adopt standards, and pursue other programs and activities affecting lighting use in the state, to reduce average statewide electrical energy consumption by 2018 for indoor residential lighting by not less than 50 percent, and for indoor commercial and outdoor lighting by not less than 25 percent compared to 2007 levels. The Energy Commission has taken a number of initial steps toward these requirements, including the adoption of the both Appliance Energy Efficiency Standards and Building Energy Efficiency Standards that achieve lighting energy savings. The Commission expects a number of additional efforts will be needed to make further progress to reach the requirements in AB 1109. These will include further updates to the Building Energy Efficiency Standards, Appliance Energy Efficiency Standards and federal lighting standards, as well as other strategies coordinated with the CPUC, IOUs, lighting industry and other stakeholders, through utility rebates, customer education, and active support from the lighting industry.
- Assembly Bill 1560[67] (Huffman, 2007) requires the Energy Commission to prescribe, by regulation, water efficiency and conservation standards for newly constructed residential and non-residential buildings, to reduce the wasteful, uneconomic, inefficient or unnecessary consumption of energy, including the energy associated with the use of water.
- Assembly Bill 662[68] (Ruskin, 2007) requires the Energy Commission to adopt standards for water-

[65] http://www.arb.ca.gov/cc/scopingplan/document/adopted_scoping_plan.pdf

[66] http://www.leginfo.ca.gov/pub/07-08/bill/asm/ab_1101-1150/ab_1109_bill_20071012_chaptered.pdf

[67] http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=200720080AB1560&search_keywords=

[68] http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=200720080AB662&search_keywords=

efficient appliances whose use, as determined by the commission, requires a significant amount of energy or water on a statewide basis.

- Governor Brown's Clean Energy Jobs Plan[69] established the priorities of his Administration to aggressively pursue clean energy jobs in California through renewable energy and energy efficiency, extending the success of programs established in his first Administration and the ensuing 30 years, which have triggered innovation and creativity in the market. The Clean Energy Jobs Plan calls for the development of 12,000 megawatts of localized, renewable electric generation by 2020, new energy efficiency standards for buildings to achieve dramatic energy savings, creating a path for making newly constructed residential and commercial buildings "zero net energy" through high levels of energy efficiency combined with onsite renewable electric generation, stronger appliance standards for lighting, consumer electronics and other products, in conjunction with increased public education and enforcement efforts so the gains promised by the efficiency standards are in fact realized.
- The 2011 IEPR[70] makes recommendations for the Building Energy Efficiency Standards (see p. 2-2) and the Appliance Energy Efficiency Standards (see p. 3-3) , which are a priority for achievement in this Action Plan.
- The ARB, Energy Commission, CPUC, CalEPA and the Independent System Operator collaborated in 2008 to develop California's Clean Energy Future Vision,[71] accompanied by an implementation plan and roadmap. California's Clean Energy Future underscored the need to continue investing in energy efficiency and clean technologies to maintain California's leadership as the most energy-efficient and forward-thinking state in the nation. The document integrates energy efficiency with the monumental effort required to attain California's renewable energy and other environmental objectives. California's Clean Energy Future re-confirmed energy efficiency as California's top priority resource, and identified renewable energy as the electric generation supply-side resource of choice. The document identified the major two goals for energy efficiency as 1) achieving zero net energy in newly constructed residential and commercial buildings, and 2) decreasing energy consumption by 30 to 70 percent in existing residential and commercial buildings. The Building and Appliance Energy Efficiency Standards play major roles in achieving these goals.

IOU Codes and Standards Program and CPUC Direction Regarding Program Integration and Strategies to support Codes and Standards, including ZNE goals and Standards compliance

The Codes and Standards (C&S) Program saves energy on behalf of ratepayers by directly influencing standards and code-setting bodies to strengthen energy efficiency regulations, by improving compliance with existing codes and standards, and working with local governments to develop and adopt local ordinances that exceed statewide minimum requirements. Codes and Standards Enhancement (CASE) studies, focused on energy efficiency improvements, are developed for promising design practices and technologies and presented to standards- and code-setting bodies. 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.

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[69] http://www.jerrybrown.org/sites/default/files/6-15%20Clean_Energy%20Plan.pdf

[70] http://www.energy.ca.gov/2011publications/CEC-100-2011-001/CEC-100-2011-001-CMF.pdf

[71] http://www.cacleanenergyfuture.org/

Decision 12-05-015[72] directed the IOUs to integrate the strategies of several programs in their portfolios to advance the State's efforts to achieve zero net energy in newly constructed buildings within the Building Energy Efficiency Standards. The Decision supported the Program Guidance Ruling's[73] direction to IOU Residential New Construction programs to:

- Use incentive design to encourage the early adoption of base and "Reach" 2013 Title 24 Standards;
- Increase incentive levels to make the program more attractive to participating home builders;
- Emphasize measures that incorporate future code cycles in Residential design curriculum, and technical design templates; and
- Support development of a Zero Net Energy Roadmap that identifies efficiency measures likely to be adopted into Title 24 Standards in 2017 and 2020 for inclusion in the IOU Residential New Construction program.

The Decision directed the IOUs to establish a timeline by which increased levels of incentives will be incorporated into their Residential New Construction program, no later than March 1, 2013. The incentive design is to encourage adoption of the base and reach codes. The Decision also concluded that the new program direction should include skills development for building professionals and technicians and increased homeowner demand for high efficiency homes. The IOUs also were directed to collaborate with the California Energy Commission, CPUC and other stakeholders to develop a ZNE roadmap that identifies efficiency measures likely to be adopted into Title 24 Residential Standards in 2017 and 2020 for inclusion in the IOU Residential New Construction program.

The Decision also supported the Programmatic Guidance Ruling's dynamic integration of early planning activities within the Codes and Standards program with supporting program activities across the IOUs' portfolio to achieve the following goals:

- Maximizing code compliance with current and future codes and standards;
- Improving code readiness to all significant energy savings opportunities identified for future code update cycles; and
- Targeting Reach Codes to achieve the Zero Net Energy goals for the residential sector by 2020 and the commercial sector by 2030.

The Decision concluded that there is a critical need for targeted and collaborative efforts with technology development leading to future codes and standards adoption. The Decision directed the IOUs to develop detailed descriptions for integration in the C&S Planning and Coordination subprogram implementation plan, including the relative roles and responsibilities of all of the following IOU programs: Codes and Standards, Emerging Technology Program, incentive programs targeting retrofits and major renovations, Residential New Construction, Savings By Design, Workforce Education and Training, Marketing, Education and Outreach, Zero Net Energy pilots, and the residential Zero Net Energy roadmap initiative.

The Decision also concluded that pilot programs should be conducted to investigate the use of incentives to support code compliance.

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[72] http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/166830.PDF - page 207-208, 246

[73] Programmatic Guidance Ruling, Attachment A http://docs.cpuc.ca.gov/efile/RULINGS/154861.pdf

The Decision also directed the IOUs to explore how their Business and Consumer Electronics and Home Energy Efficiency Rebates program can support manufacturers' implementation of voluntary product specifications that support the development of mandatory standards for plug loads and appliances, through discussions with interested parties and in conjunction with their Codes and Standards programs (OP 66). The Decision also directed the IOUs to develop proposals for strategic discussion of how they will use these programs to advance market transformation toward Appliance Standards changes.

Decision 12-05-015 also directed the investor owned utilities to address the reduction of plug loads and advancement of integrated building design in OP 103. 'Pacific Gas and Electric Company, Southern California Edison Company, San Diego Gas & Electric Company, and Southern California Gas Company shall revise and update their Emerging Technologies program implementation plan to address the directives included in this Decision, including details on its programmatic initiatives that will accomplish the reductions in plug loads and advancing building integrated design and operation solutions to achieve the Zero Net Energy goals of the Strategic Plan.'

Senate Bill 454[74] Mandates

- Authorizes the Energy Commission to establish an administrative enforcement process to enforce the requirements in the Appliance Energy Efficiency Standards.
- Provides for the assessment of civil penalties by the court, or administrative penalties by the Energy Commission for the violation of the standards set forth in the Appliance Standards.
- Requires that the penalties collected be deposited into an "Appliance Efficiency Enforcement Subaccount" for use (when appropriated) for public education on appliance efficiency, and for enforcement.
- Requires courts, when granting relief for a violation, to award the Energy Commission's costs incurred for investigating and prosecuting an action.
- Requires that any rebate given by a public utility for energy efficient equipment installation be disbursed only if the installation was done with a permit and by a licensed contractor.

[74] http://www.leginfo.ca.gov/pub/11-12/bill/sen/sb_0451-0500/sb_454_bill_20111008_chaptered.pdf

Potential Priorities for the Future

Some areas that have been identified for future consideration include the following:

- Two-way communication devices that could be integrated into appliances to enable capability for interacting with the smart grid.
- Research regarding integration of smart appliances[75] and control mechanisms with the rest of the building's systems.
- Research related to ongoing alignment of AB 32 goals and energy efficiency goals.
- CPUC and Energy Commission coordination with IOUs and other market actors to develop standards for smart appliances that are compatible with demand response technologies.
- Energy Commission to coordinate with Collaborative Labeling & Appliance Standards Program (CLASP)[76] to track development of Appliance related codes and standards at the international level.
- Energy Commission investigation of the feasibility of creating Quick Response (QR) codes for appliances that would allow retailers/consumers to access efficiency and performance data in the Appliance Efficiency Database.
- Appliance Sales Tracking Database
- Commercial and non-commercial food preparation equipment with potential for reducing exhaust hood fan motor usage to save energy.
- Revising the test procedures for water heaters to allow efficiency credits for waste heat recovery systems; for instance, use of waste heat from heat pumps and compressors to heat and store water.
- Irrigation controls, such as moisture sensors to shut down the system on rainy days.
- Investigation of a systems approach[77] to capture large scale energy savings that make a more substantial contribution toward ZNE than individual appliance standards.

[75] Smart appliances utilize modern computer and communications technology to make functions faster, cheaper and more energy-efficient. The appliances can take advantage of an energy "smart grid" by communicating and responding to demand response signals.

[76] http://www.clasponline.org/en/WhoWeAre

[77] Systems approach implies addressing appliance use in conjunction with building envelope and other systems. One such example is the effective use of heat recovery from large appliances in offsetting the heating energy requirement.