

Application No.: A.08-07-021
Exhibit No.: SCE-3B (Amended)
Witnesses: G. Rodrigues



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(U 338-E)

***SCE's 2009-2011 Energy Efficiency Program Plan
Implementation Plans***

Before the
Public Utilities Commission of the State of California

Rosemead, California
March 2009

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HVAC: Residential and Commercial HVAC Program

1. **Program Name:** Residential and Commercial HVAC Program
Program ID#: SCE-SW-007
Program Type: Core

2. Projected Program Budget Table

Table 1¹

SCE-SW-007	Main Program Name / Sub-Program	Total Administrative Cost (Actual)	Total Marketing & Outreach (Actual)	Total Direct Implementation (Actual)	Integration Budget Allocated to other Programs (If Applicable)	Total Budget By Program (Actual)
CROSSCUTTING						
	Residential & Commercial HVAC Program					
	Upstream HVAC Equipment Incentive	\$ 1,189,597	\$ 181,807	\$ 12,650,595		\$ 14,022,000
	HVAC Technologies and System Diagnostics Advocacy	\$ 1,012,196	\$ 73,432	\$ 10,470,372		\$ 11,556,000
	Commercial Quality Installation	\$ 298,087	\$ 1,397,714	\$ 1,190,199		\$ 2,886,000
	ENERGY STAR Residential Quality Installation Program	\$ 302,205	\$ 1,397,714	\$ 1,256,081		\$ 2,956,000
	Residential Quality Maintenance and Commercial Quality Maintenance Development	\$ 2,870,368	\$ 1,530,229	\$ 30,109,403		\$ 34,510,000
	HVAC Workforce Education & Training	\$ 895,122	\$ 107,194	\$ 9,480,685		\$ 10,483,000
	TOTAL:	\$ 6,567,575	\$ 4,688,090	\$ 65,157,335	\$ -	\$ 76,413,000

3. Projected Program Gross Impacts Table – by calendar year

Table 2

SCE-SW-007	Residential & Commercial HVAC Program	2009-11 EE Program Gross kWh Savings	2009-11 EE Program Gross kW Savings	2009-11 EE Program Gross Therm Savings
	Upstream HVAC Equipment Incentive	38,637,911	19,694	-
	HVAC Technologies and System Diagnostics Advocacy	6,917,407	7,236	-
	Commercial Quality Installation	-	-	-
	ENERGY STAR Residential Quality Installation Program	9,235	15	-
	Residential Quality Maintenance and Commercial Quality Maintenance Development	78,879,347	65,009	-
	HVAC Workforce Education & Training	-	-	-
	TOTAL	124,443,900	91,954	-

¹ Definition of Table 1 Column Headings: Total Budget is the sum of all other columns presented here
Total Administrative Cost includes all Managerial and Clerical Labor, Human Resource Support and Development, Travel and Conference Fees, and General and Administrative Overhead (labor and materials).
Total Direct Implementation – includes all financial incentives used to promote participation in a program and the cost of all direct labor, installation and service labor, hardware and materials, and rebate processing and inspection used to promote participation in a program.
Total Marketing & Outreach includes all media buy costs and labor associated with marketing production.
Integrated Budget Allocated to Other Programs includes budget utilized to coordinate with other EE, DR, or DG programs.
Total Budget is the sum of all other columns presented here
Definition of Sub-Program: A “sub-program” of a program has a specific title; targets; budget; uses a unique delivery or marketing approach not used across the entire program; and for resource programs, has specific estimated savings and demand impacts.

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4. Program Description

a) Describe program

The Residential and Commercial HVAC Program is a Statewide program that will continue the transformation process of California's HVAC market to ensure that:

- HVAC technology, equipment, installation, and maintenance are of the highest quality;
- Quality installation and maintenance practices are easily recognized and requested by customers;
- The HVAC value chain is educated and understands their involvement with energy efficiency and peak load reduction; and
- The above changes lead to sustained profitability for HVAC trade allies as the business model for installing and maintaining heating and cooling systems changes from a commodity-based to a value-added service business.

The IOUs propose building towards this vision for HVAC by implementing a comprehensive set of downstream, midstream, and upstream strategies that builds on existing program, education, and marketing efforts and leverages relationships within the HVAC industry to transform the market towards a sustainable, quality driven market. Through this Statewide HVAC Program and a Statewide HVAC Industry Leadership Task Force, we will gain a better understanding of the market response to our programs, as well as the behavioral implications of the various market participants, and then actively revise/update strategies and programs accordingly, as guided by the California Long-term Energy Efficiency Strategic Plan (Strategic Plan).

Market transformation and direct energy savings and demand reductions will be achieved through a series of sub-programs that are described in detail in separate PIPs and summarized below:

Upstream HVAC Equipment Incentive

This sub-program offers incentives to distributors who sell qualifying high-efficiency HVAC equipment. The logic that underscores this sub-program's design is that a small number of distributors and manufacturers are in a position to impact hundreds of thousands of customers and influence their choice of equipment by increasing the stocking and promotion of high-efficiency HVAC equipment. The upstream model cost-effectively leverages this market structure and existing relationships. The sub-program also provides an online rebate application system to facilitate distributor sales and invoice tracking, which further reduces administrative costs as compared with paper application processing.

HVAC Technologies and System Diagnostics Advocacy

This sub-program is a coordination and advocacy program that addresses the priority need for immediate and comprehensive action addressing elements critical to increasing, optimizing and maintaining the energy and peak electricity efficiency performance of direct expansion vapor-compression-based cooling equipment and accelerating the market introduction of a range of advanced evaporative-based

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cooling technologies. The sub-program will be implemented by the Western Cooling Efficiency Center (WCEC) and funded by the IOUs. The sub-program includes:

- Unprecedented participation by HVAC industry stakeholders in research, development, and design, continuous review and updating, and operation of HVAC-related IOU programs; and
- Cooperation and collaboration with the HVAC industry for the purpose of substantially advancing HVAC-related program quality and effectiveness.

A continuous program improvement process will be introduced to provide an active, real-time means for improving program effectiveness and incorporating results between planning cycles.

Commercial Quality Installation

This sub-program is applicable to installations of packaged HVAC systems with a rated capacity up to 760,000 BTU/H. Through this sub-program, a financial incentive will be available to contractors who complete a system installation in accordance with the appropriate industry standards (e.g., ACCA, SMACNA and ASHRAE). Contractors will be actively recruited into the program by offering them the opportunity to receive financial and performance incentives such as utility co-branding opportunities, diagnostic equipment for reaching specific performance milestones, and assistance aligning with the ENERGY STAR® Service & Product Provider program.

HVAC ENERGY STAR® Residential Quality Installation

This sub-program is applicable to installations of central air conditioning (CAC) systems and air-source heat pump (HP) systems, with a rated capacity up to 65,000 BTU/H. Through this sub-program, a financial incentive will be available to homeowners who have a system installed in accordance with the EPA HVAC Quality Installation Guidelines. The installation requirements are illustrated in detail in *ANSI/ACCA 5 QI-2007: HVAC Quality Installation Specification*. In addition to this incentive, homeowners will also receive an ENERGY STAR® certificate for their qualifying installation. Contractors will be actively recruited into the sub-program by offering them the opportunity to receive performance incentives such as utility co-branding opportunities and diagnostic equipment for reaching specific performance milestones.

HVAC Residential Quality Maintenance and Commercial Quality Maintenance Development

This sub-program may represent one of the more creative aspects of the HVAC “Big Bold Energy Efficiency Strategy” initiatives. It is based on the assumption that there are energy and demand savings achievable through the regular application of quality maintenance (QM)² procedures applied to existing residential and commercial HVAC

² While residential maintenance and unitary commercial maintenance are alike in that the equipment being serviced can be similar in form and function, there are dramatic differences in the ways business is marketed and sold, the depth and breadth of maintenance measures normally provided, and the complexity of the customer-contractor relationship.

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equipment. This sub-program intends to (1) quantify those potential savings and (2) if cost-effective, develop both a residential and a small commercial program to implement a comprehensive, continuously improving O&M activity that captures savings and provides a high return on investment to the end-user, thus driving the market transformation of the HVAC industry.

HVAC Workforce Education and Training

This sub-program will deliver a dedicated industry-specific effort that offers education and training opportunities targeted at all levels of the HVAC value chain. Before starting such an activity, and as outlined in the Strategic Plan, the sub-program will conduct a comprehensive training needs assessment to determine industry skill gaps, identify opportunities for collaboration with existing HVAC education and training infrastructure, and implement recommendations needed to close gaps at all levels of the industry.

b) List measures

To achieve the market transformation desired by the Strategic Plan, a variety of appropriate financial and non-financial incentives is required to influence specific market actions. Incentives will be targeted to all levels of the HVAC value chain (i.e., manufacturers, distributors, contractors and customers) and will be available for equipment (the ENERGY STAR® Residential Quality Installation and Upstream sub-programs) and services (the ENERGY STAR® Residential Quality Installation, Commercial Quality Installation, and Commercial Quality Maintenance Development sub-programs). Specific financial incentives are provided in Section 4.b of the sub-program PIPs, while non-financial incentives are discussed throughout the PIPs.

c) List non-incentive customer services

The program will be active in a number of non-resource activities. These activities are required to ensure that the HVAC industry is fully involved in the development and implementation of the many tactics required to address the short and long-term goals of the Strategic Plan. One such non-resource activity is an HVAC Industry Leadership Task Force that will be initially chartered and funded by the IOUs. The HVAC Industry Leadership Task Force is necessary to keep the industry engaged in the Strategic Plan process and to provide guidance and support for the implementation of the various tactics required to transform the industry. Mindful that HVAC industry organizations are not traditionally structured or staffed, and have not traditionally allocated enough resources to achieve the level of involvement envisioned by the Strategic Plan, the HVAC Convener's Report concluded that: *"The agencies and utilities should work together to ensure the working group is adequately funded to meet its responsibilities."*³

For that reason, in 2009, two separate Quality Maintenance programs will be developed in collaboration with the HVAC industry and be launched in 2010, one for residential and the other for small commercial. For the sake of brevity, however, throughout this Program Implementation Plan and its Sub-program Plans, "quality maintenance," whether residential or commercial is simply referred to as "QM."

³ HVAC Convener's Report, Appendix B.5, Pg 10.

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It is envisioned that this HVAC Industry Leadership Task Force will involve high-level HVAC industry stakeholders, such as manufacturers, distributors, contractors, associations, organized labor and influential end-user customers—to coordinate industry sponsorship of and participation in HVAC strategies. Membership should also include other key players, including the CPUC, the California Energy Commission (CEC), utilities, building owners/managers, university researchers, consumers, and the Federal Government. The HVAC Industry Leadership Task Force will be charged with establishing and prioritizing a substantial IOU-funded response (recognizing the roles of other appropriate organizations including CEC, the publicly-owned utilities, and local governments) to the activities described in the suite of IOU-proposed HVAC Programs — both utility administered programs and third-party administered programs which focus on HVAC efficiency — resulting in a structured roadmap with specific actions, schedules, and the technical and financial resources identified to initiate near-term, mid-term and long-term issue resolution.

The HVAC Industry Leadership Task Force will ultimately provide the necessary guidance to both California and the western U.S. so that the many issues required to transform the industry can be prioritized and facilitated by the IOUs and the WCEC (as described in the HVAC Technologies and System Diagnostics Advocacy sub-program).

Some of the initial actions of the HVAC Industry Leadership Task Force may include:

- Establishing a formal charter that governs its existence. The charter will be approved by the IOUs and the CPUC before authorizing and/or funding the HVAC Industry Leadership Task Force.
- Recommending guidelines that would make it possible for IOUs to directly contract with existing HVAC industry institutions (e.g., associations, societies, conference hosts, and the trade press) through a rigorous Request For Quotation (RFQ) or similar processes to implement specific aspects of IOU-administered energy efficiency programs.
- Making recommendations for standards and qualification guidelines for trainers and educators who receive funding from the IOUs.
- Developing an “HVAC Action Plan” that prioritizes specific actions required to address the Strategic Plan.
- Immediately and formally reaching out to utilities in neighboring states, including Arizona, Colorado, Nevada, New Mexico, and Utah, and energy organizations in the Pacific Northwest, to involve them in the overall planning and implementation processes.
- Identifying for inclusion in the HVAC Action Plan other HVAC technical work underway through the existing IOU programs, CEC/PIER-BERG, LBNL, HVAC industry vendors, and others inside and outside California. Much of this work is continuing in a fragmented way. A cohesive planned and prioritized framework and action is needed.
- Channeling appropriate HVAC work through the existing IOU program framework, on a fully-planned basis, not on an *ad hoc* basis.

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- Integrating all efforts as appropriate with the current and out year work plans of the WCEC.
- Integrating the suite of demand response/demand side management (DR/DSM) options that are already considered in utility DR/DSM programs as well as additional solutions that are emerging for residential and small commercial markets.

Before chartering the HVAC Industry Leadership Task Force, several preparatory actions are required, including:

1. In cooperation with the Energy Division, the HVAC Energy Efficiency Advisor, and perhaps CEC, plan and host an HVAC Energy Efficiency Roundtable ("The Roundtable") to which will be invited potential candidates for membership and participation in the inaugural HVAC Industry Leadership Task Force. Topics for discussion at The Roundtable will include:
 - The Strategic Plan, with particular emphasis on IOU/HVAC industry collaboration and tactics necessary to achieve the short and long-term goals.
 - Constructive criticism (lessons learned) about IOU HVAC programs, including the 2006-2008 tune-up programs.
 - 2009-2011 HVAC related PIPs filed by the IOUs, with particular emphasis on the Technologies and System Diagnostics Sub-programs.
 - Report on the 2006 HVAC Diagnostics Roundtable and subsequent Fault Detection and Diagnostics Roundtable in 2007.
 - Recommendations for the structure, charter, mission and makeup of the HVAC Industry Leadership Task Force.
 - High priority issues as established by Roundtable participants in facilitated discussions.

Potential guest participants in The Roundtable could include representatives from: (1) the CPUC, (2) the Governor's Office, (3) the California Air Resources Board, (4) the Western Governors' Association, and/or (5) the California Department of Education.

2. Negotiate a statement of work with the WCEC to actively participate in and co-host The Roundtable in anticipation of its being supported as the home and first line of support for the HVAC Industry Leadership Task Force.

5. Program Rationale and Expected Outcome

a) Quantitative Baseline and Market Transformation Information

Market Transformation (MT) metrics proposed in Tables 3 and 4 are preliminary. The proposed metrics are meant to initiate a collaborative effort to elaborate meaningful metrics that will provide overall indicators of how markets as a whole are evolving. MT metrics should neither be used for short-term analyses nor for specific program analyses; rather, should focus on broad market segments.

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Market transformation is embraced as an ideal end state resulting from the collective efforts of the energy efficiency field, but differing understandings of both the MT process and the successful end state have not yet converged. The CPUC defines the end state of MT as “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 further publicly-funded intervention is no longer appropriate in that specific market.”⁴ The Strategic Plan recognizes that process of transformation is harder to define than its end state, and that new programs are needed to support the continuous transformation of markets around successive generations of new technologies⁵.

Market transformation programs differ from resource acquisition programs on 1) objectives, 2) geographical and 3) temporal dimensions, 4) baselines, 5) performance metrics, 6) program delivery mechanisms, 7) target populations, 8) attribution of causal relationships, and 9) market structures⁶. Markets are social institutions⁷, and transformation requires the coordinated effort of many stakeholders at the national level, directed to not immediate energy savings but rather to intermediary steps such as changing behavior, attitudes, and market supply chains⁸ as well as changes to codes and standards. Resource acquisition programs rely upon the use of financial incentives, but concerns have been raised that these incentives distort true market price signals and may directly counter market transformation progress⁹. According to York¹⁰, “Market transformation is not likely to be achieved without significant, permanent increases in energy prices. From an economic perspective, there are 3 ways to achieve market transformation: (1) fundamental changes in behavior, (2) provide proper price signals, and (3) permanent subsidy.”

The question of what constitutes successful transformation is controversial because of a Catch-22: Market transformation is deemed successful when the changed market is self-sustaining, but that determination cannot be made until after program interventions are ended. Often, however, the need for immediate energy and demand savings or immediate carbon-emissions reductions will mean that program interventions may need to continue, which would interfere with the evaluation of whether MT is self-sustaining. Market transformation success has also been defined

⁴ California Public Utilities Commission Decision, D.98-04-063, Appendix A.

⁵ California Public Utilities Commission (2008) *California Long Term Energy Efficiency Strategic Plan*, p. 5. Available at <http://www.californiaenergyefficiency.com/docs/EEStrategicPlan.pdf>

⁶ Peloza, J., and York, D. (1999). “Market Transformation: A Guide for Program Developers.” Energy Center of Wisconsin. Available at: <http://www.ecw.org/ecwresults/189-1.pdf>

⁷ Blumstein, C., Goldstone, S., & Lutzenhiser, L. (2001) “From technology transfer to market transformation”. Proceedings of the European Council for an Energy Efficient Economy Summer Study. Available at http://www.ecee.org/conference_proceedings/ecee/2001/Panel_2/p2_7/Paper/

⁸ Sebold, F. D., Fields, A., Skumatz, L., Feldman, S., Goldberg, M., Keating, K., Peters, J. (2001) *A Framework for Planning and Assessing Publicly Funded Energy Efficiency*. p. 6-4. Available at www.calmac.org.

⁹ Gibbs, M., and Townsend, J. (2000). The Role of Rebates in Market Transformation: Friend or Foe. In *Proceedings from 2000 Summer Study on Energy Efficiency in Buildings*.

¹⁰ York, D., (1999). “A Discussion and Critique of Market Transformation”, Energy Center of Wisconsin. Available at <http://www.ecw.org/ecwresults/186-1.pdf>.

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in terms of higher sales of efficient measures than would have otherwise occurred against a baseline absent of program interventions. The real world, however, provides no such control condition. Evaluators must estimate these baselines from quantitative factors such as past market sales that may be sparse and/or inaccurate - particularly for new products. Evaluations must also defer to expert judgments on what these baselines may have been as well as on the degree of successful market transformation¹¹. Due to the subjective nature of these judgments, it is imperative that baselines as well as milestone MT targets be determined and agreed upon through collaborative discussion by all stakeholders, and these targets may need periodic revision as deemed necessary by changing context.

Market transformation draws heavily upon diffusion of innovation theory¹², with the state of a market usually characterized by adoption rate plotted against time on the well-known S-shaped diffusion curve. In practice, however, the diffusion curve of products may span decades¹³. Market share tracking studies conducted 3, 5 or even 10 years after the start of an MT program may reveal only small market transformation effects¹⁴. The ability to make causal connections between these market transformation effects and any particular program's activities fades with time, as markets continually change and other influences come into play.

These challenges mentioned above are in reference to programs that were specifically designed to achieve market transformation; and these challenges are only compounded for programs that were primarily designed to achieve energy and demand savings. However, since the inception of market transformation programs almost two decades ago, many lessons have been learned about what the characteristics of successful MT programs are. First and foremost, they need to be designed specifically to address market transformation. "The main reason that (most) programs do not accomplish lasting market effects is because they are not designed specifically to address this goal (often because of regulatory policy directions given to program designers.)¹⁵" The Strategic Plan recognizes that regulatory policies are not yet in place to support the success of market transformation efforts¹⁶, but also reflects the CPUC's directive to design energy efficiency programs that can lay the groundwork for either market transformation success or for codes and standards changes.

Above all else, the hallmark of a successful market transformation program is in the coordination of efforts across many stakeholders. The most successful MT programs

¹¹ Nadel, S., Thorne, J., Sachs, H., Prindle, B., and Elliot, R.N. (2003). "Market Transformation: Substantial Progress from a Decade of Work." American Council for an Energy-Efficient Economy, Report Number A036. Available at: <http://www.aceee.org/pubs/a036full.pdf>

¹² Rogers (1995) Diffusion of Innovations, 5th Ed.

¹³ Example in bottom chart of this graphic from the New York Times: <http://www.nytimes.com/imagepages/2008/02/10/opinion/10op.graphic.ready.html>

¹⁴ Sebold et al (2001) p. 6-5,

¹⁵ Peters, J.S., Mast, B., Ignelzi, P., Megdal, L.M. (1998). *Market Effects Summary Study Final Report: Volume 1.* Available at <http://calmac.org/publications/19981215CAD0001ME.PDF>.

¹⁶ CPUC (2008) Strategic Plan, p. 5.

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have involved multiple organizations, providing overlapping market interventions¹⁷. The Strategic Plan calls for coordination and collaboration throughout, and in that spirit the utilities look forward to working with the CPUC and all stakeholders to help achieve market transformation while meeting all the immediate energy, demand, and environmental needs. Drawing upon lessons learned from past MT efforts, the Energy Center of Wisconsin's guide for MT program developers¹⁸ suggests that the first step is not to set end-point definitions, progress metrics or goals. Rather, the first steps include forming a collaborative of key participants. As the Strategic Plan suggests, these may include municipal utilities, local governments, industry and business leaders, and consumers. Then, with the collective expertise of the collaborative, we can define markets, characterize markets, measure baselines with better access to historical data, and define objectives, design strategies and tactics, implement and then evaluate programs. The collaborative will also provide insights that will set our collective expectations for the size of market effects we can expect, relative to the amount of resources we can devote to MT. No one organization in the collaborative will have all the requisite information and expertise for this huge effort. This truly needs to be a collaborative approach from the start.

The metrics and baselines described below in Tables 3 and 4 are presented for the purposes of starting the much-needed discussion between all key participants. These are suggestions, intended to allow key participants to pilot-test processes for establishing baseline metrics, tracking market transformation progress, and for refining evaluation tools. Early trial of these evaluation metrics will reveal any gaps in data tracking so that we may refine our processes before full-scale market transformation evaluations take place.

The set of metrics we selected is intentionally a small set, for several reasons. First, as mentioned, the full set of metrics and baselines need to be selected by key participants. Second, we anticipate that market share data for many mid- and low-impact measures will be too sparse to show MT effects and not cost-effective to analyze. Third, we selected core measures and metrics that would both be indicative of overall portfolio efforts. These measures are also likely to be offered on a broad level by other utilities, providing a greater base of sales and customer data that could be analyzed for far-reaching MT effects.

Therefore, for the HVAC sector, the following approach to quantitative baseline and market transformation information is presented as follows.

Historically, the nonresidential retrofit programs have had very low uptake rates on high-efficiency HVAC systems. Consequently, a first step towards market transformation is to do what it takes to achieve a high level of program participation, thereby increasing market share of high-efficiency equipment sales and quality installations. An initial increase in market share allows for increased levels of

¹⁷ Nadel, Thorne, Saches, Prindle & Elliot (2003).

¹⁸ Pelozo & York, (1999).

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customer, installer, and distributor/manufacturer knowledge and interest in these systems, which should make further increases easier. In addition, tracking the ratio of certified HVAC technicians in the field, over time, can provide a gauge of the likelihood for quality installations and maintenance.

With this discussion in mind, IOUs propose the following metrics for this sector:

Table 3

	Baseline Metric		
	Metric A	Metric B	Metric C
Measure-based metric	The ratio of high efficiency CEE Tier 1 and Tier 2 equipment over a base case		
Quality Installation (Commercial and Residential)		The ratio of quality installations over a base case	
Workforce Education & Training			The ratio of certified HVAC technicians (ICE and NATE) in the workforce relative a base case of HVAC technicians

b) Market Transformation Information

As stated above, market transformation draws heavily upon diffusion of innovation theory, with the state of a market characterized by adoption rate plotted against time on the well-known S-shaped diffusion curve. In practice, however, the diffusion curve of products may span decades. Market share tracking studies conducted 3, 5 or even 10 years after the start of an MT program may reveal only small market transformation effects. Therefore it is problematic, if not impractical, to offer internal annual milestones towards market transformation sectors and specific program activities.

As a consequence, it is not appropriate to offer more than broad and general projections. Any targets provided in the following table are nothing more than best guesstimates, and are subject to the effects of many factors and market forces outside the control of program implementers.

Table 4

	Internal Market Transformation Planning Estimates		
	2009	2010	2011
The ratio of high efficiency CEE Tier 1	Improvement over baseline, over time	Improvement over baseline, over time	Improvement over baseline, over time

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	Internal Market Transformation Planning Estimates		
	2009	2010	2011
and Tier 2 equipment over a base case			
The ratio of quality installations over a base case	Improvement over baseline, over time	Improvement over baseline, over time	Improvement over baseline, over time
The ratio of certified HVAC technicians (ICE and NATE) in the workforce relative a base case of HVAC technicians	Improvement over baseline, over time	Improvement over baseline, over time	Improvement over baseline, over time

c) Program Design to Overcome Barriers

The program will address the following barriers:

- **Lack of awareness:** By quantifying the energy efficiency benefits of QI/QM, the benefits of QI/QM (as well as those “premium” HVAC services that prove to exceed the ANSI QI/QM standards) will be better understood by program participants. It is our goal to discover the evidence, and expected return on investment, that customers will require to authorize payment for these measures when subsidies are removed.
- **Performance uncertainties:** Previous research has been conducted on the energy savings achievable through HVAC system maintenance measures such as RCA and Duct Sealing. Despite all this research, many performance uncertainties still exist, and furthermore, this research has not been able to effectively demonstrate the full energy savings benefits of QI/QM. One of the first tasks conducted by the program will be to conduct a comprehensive research study that is vetted by the HVAC industry to quantify the real energy savings that consumers can expect to achieve through QI/QM. This study will also include the appropriate level of behavioral studies to learn why customers don’t currently value QI/QM and what factors are needed to motivate consumers to act. This level of study is required to quantify the cost/benefit for delivering and receiving QI/QM services.
- **Asymmetric Information:** Delivering QI/QM training opportunities through existing industry channels (e.g., distributors, trade associations, labor unions, etc.) will provide a higher level of credibility for QI/QM training rather than offering it exclusively through IOUs.
- **Bounded rationality:** It is logical to assume that the HVAC industry would want to take the necessary training required to deliver high quality service. However, market dynamics have not supported such logic as the industry has largely become commoditized and low price/low quality typically wins out. Over the 2009-2011 program cycle, the IOUs will conduct behavioral research to understand the existing dynamics that will help influence the necessary changes so that the marketplace will value and purchase higher quality services.

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- Hidden costs: By encouraging contractors to promote the concepts and value of quality maintenance at the time of system installation, the customer will be more likely to regularly maintain the system and be assured that the energy efficiency performance benefits of their new system will continue throughout the life of their system.
- Organizational customs: The HVAC industry has largely become commoditized into an industry driven by low costs and quality, where quality is assumed but not understood or valued by the customer. This is a result, in part, of contractors having minimal success in communicating the value of QI/QM to consumers and consumers not understanding the linkages between comfort and energy use. The Statewide QI/QM program effort will work toward demonstrating the value proposition of a high-quality contracting business and educating consumers on the energy benefits of QI/QM.

d) Quantitative Program Targets

The program will work to achieve the following program targets. The proposed targets may be modified due to funding restrictions, especially for the 2009 bridge funding year.

Table 5

	Program Target by 2009	Program Target by 2010	Program Target by 2011
ENERGY STAR® Residential QI	Achieve approximately 900 system installations by 2011		
Commercial QI	Achieve approximately 900 system installations by 2011		
Commercial Upstream	Deliver approximately 60,000 tons of efficient commercial equipment by 2011		
Quality Maintenance	TBD*		
Technology and System Diagnostics Advocacy	TBD*		
Workforce Education and Training	Facilitate the delivery of more than 100 QI/QM related training courses through existing industry training channels		

*At this point, reasonable targets cannot be determined.

e) Advancing Strategic Plan goals and objectives

The program will help to achieve the following near-term strategic goals as identified in Chapter 6 of the Strategic Plan:

- 2-1: Create a Statewide QI/QM Brand

Leveraging the ENERGY STAR® brand equity is a cost-effective approach to introducing an immediate QI/QM brand. Additional efforts will be dedicated to evaluating whether a California specific brand is viable.

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- 2-2: Launch Statewide Brand

IOU-sponsored co-branding efforts will be developed based on the branding activity and made available to contractors for promotion of the QI/QM effort.

- 2-3: Provide expanded QI/QM training

Prior to launching the program, HVAC service technicians will be fully trained on the delivery of the measures promoted by the program. Furthermore, feedback mechanisms will be used to continually evaluate technician performance to ensure that they are applying the information they are being taught in the QI/QM training.

- 2-4: Implement contractor accreditation program

Additional benefits will be made available through the sub-program to support the HVAC WE&T efforts of increasing the level of technician certification. Such efforts may include additional IOU promotion of contractors (e.g., “Gold Star Contractors”) who maintain a minimum of percentage of ICE and NATE-certified technicians (e.g., 70%), reimbursement of testing costs and/or continuing education units for participating contractors, etc.

- 3-3: Accelerate whole-building educational opportunities

Create pathways for HVAC contractors to evolve into whole building contractors by partnering with private and public community colleges and/or universities to develop the appropriate curriculum on whole building design practices.

- 4-1: Pursue regional climate-optimized equipment standards

IOU staff, in close consultation with WCEC/CEC and other appropriate parties, will continue to stay attentive to and engaged in the federal proceeding as it continues into 2011.

- 4-3: Accelerate market penetration of advanced technologies

Partnering with manufacturers through activities such as the WCEC’s Western Cooling Challenge will increase their dedication to developing climate-appropriate equipment that delivers energy savings and peak load reduction.

- 4-4: Adopt a progressive set of building codes that support peak-efficient equipment

Through the efforts proposed by the Statewide Codes and Standards Program, the IOUs will continue to work with the CEC to advance current building codes.

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- 4-5: Develop standards for on-board diagnostic functionality

Evaluating the use of hand-held and other types of systems in the field will assist in determining viable protocols for both commercial and residential applications. Diagnostic standards development specifically for packaged rooftop HVAC units is being supported through the PIER diagnostics project, with WCEC involvement.

- 4-6: Prioritize in-field diagnostic approaches

Conducting the appropriate level of research into existing diagnostic and verification approaches will provide the IOUs and the HVAC industry with the information necessary to target future efforts based on quantifiable energy efficiency benefits. This work is being supported through the PIER diagnostics project, with WCEC involvement.

6. Program Implementation

a) Statewide IOU coordination

The IOUs will jointly participate in California's residential and commercial HVAC efforts to achieve real-market transformation. In order to accomplish this task, the IOUs will use the principles of adaptive management and follow a structured process to continuously update and enhance the program throughout the 2009-2011 program cycle. The process will be as follows:

- **Designate an IOU Program Lead** – The process for adaptive management will begin with each IOU designating an HVAC Program Lead. The lead will be the conduit through which information between IOUs will flow and will investigate new innovations, special accomplishments and challenges faced by sub-program managers and the managers of cross-cutting Statewide programs within their own IOU. Where such innovations or challenges intersect HVAC and show potential for improving the HVAC program, the Program Lead will present such information to a quarterly HVAC Program Management Team meeting.
- **Hold Quarterly HVAC Program Management Team Meetings** – At this quarterly meeting, individual innovations and accomplishments experienced in one IOU will be transmitted to all IOUs. The HVAC Program Management Team will evaluate the innovations and accomplishments of the individual IOUs, hear ideas for course corrections and overcoming challenges, measure the HVAC program's progress against Statewide metrics and goals, and prepare summations for presentation to the HVAC Industry Leadership Task Force at its semi-annual meeting.
- **Adopt Program Enhancements** – Once the HVAC Program Management Team agrees that a particular idea or innovation has merit on a Statewide-level, each IOU Program Lead will distribute the information to their sub-program managers for adoption and integration as appropriate. In some cases, it may be necessary to invite the sub-program managers to the HVAC Program Management Team to get their feedback and ensure they receive the same message.

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- **Evaluate Program Enhancements Against Statewide Targets** – To complete the adaptive management loop, the HVAC Program Management Team will track the program’s accomplishment of Statewide targets and goals to ensure that adopted program enhancements are generating their intended results.¹⁹ The HVAC Program Management Team will determine whether future course corrections are needed, and if so, will activate a fresh start of the adaptive management cycle to generate the improvements necessary to stay on track.

Additional areas of program coordination include:

i. Program name: Residential and Commercial HVAC Program.

ii. Program delivery mechanisms

The Residential and Commercial HVAC Program is the umbrella activity that encompasses the six sub-programs discussed in more detail in their own unique PIPs and summarized above in Section 4.a. The IOUs will deliver the program through a combination of third-party vendors and internal administrative staff. The program will be delivered in collaboration with existing industry infrastructures in order to increase its overall effectiveness. Program guidance will be provided to the CPUC/IOUs through the HVAC Industry Leadership Task Force as described above.

iii. Incentive levels

See Section 4.b., above, and the sub-program PIPs below, for more details on specific measure incentive levels.

iv. Marketing and outreach plans

Specific outreach efforts will be made to the industry to keep it engaged in the Strategic Plan process (both updates to and implementation of). On a macro level, this outreach will occur through the HVAC Industry Leadership Task Force and any subcommittees established by this group. On a micro level, each sub-program has specific tactics in place to engage the industry in its own particular demand reduction, energy savings and market transformation objectives.

v. IOU program interactions

One of the strategies outlined in the Strategic Plan HVAC chapter is to create a better linkage between the CEC’s Title 24 compliance efforts with the IOU energy efficiency programs.²⁰ Previous efforts have been managed with different, yet consistent purposes. In order to achieve the market transformation goals of the Strategic Plan, the IOUs will support CEC and CPUC attempts to develop one common effort. Interaction with other IOU programs will be coordinated through the adaptive management process described above. Within

¹⁹ The long-term nature of market transformation activities desired by the Strategic Plan necessitates a careful review process that allows specific program tactics to fully develop to determine whether they are actually generating the intended market results.

²⁰ Strategic Plan, September 2008, §6.4-6.5, p. 62

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this process, a Joint HVAC/Emerging Technologies/Codes and Standards Program Management Team (“Joint Program Management Team”) will be established to ensure that the individual program efforts are aligned and progressing towards the same near and long-term goals.

vi. Similar IOU and POU programs

POUs manage many different types of HVAC programs. However, none of them seeks to accomplish the aggressive market transformation goals being proposed by the IOUs. During the 2009-2011 program cycle, the IOUs will seek to increase their interactions with the POUs to better align IOU and POU HVAC programs. This may involve the creation of periodic California HVAC Energy Efficiency Summits to increase awareness of the Strategic Plan and how programs could and should be designed to help meet its aggressive targets.

b) Program delivery and coordination

The program will be coordinated with the following activities:

i. Emerging Technologies program

The program is expected to interact extensively with the Emerging Technologies Program to ensure the proper focus on remote and on-board diagnostic equipment. Coordination of HVAC, Codes and Standards and Emerging Technologies activities will be realized through an inter-utility program management team (consisting of the appropriate program managers from the four IOUs) that meets on a quarterly basis to discuss program integration and implementation issues.

ii. Codes and Standards program

The responsibility for HVAC codes and standards issues has been given to the Statewide Codes and Standards Program. This will ensure that the code-based solutions are consistent with that program’s other activities. Section 6 of the Codes and Standards PIP describes the specific actions that the program will employ to address HVAC. HVAC, Codes and Standards, and Emerging Technologies activities will be coordinated through the Joint Program Management Team.

iii. WE&T efforts

WE&T needs for the HVAC industry are unique to the industry. Therefore, the IOUs have decided to place the responsibility of managing the effort under the HVAC Program umbrella rather than the Statewide IOU WE&T Program umbrella. However, the HVAC WE&T activity will be coordinated with the Statewide activity to ensure that the individual efforts are complementary (e.g., HVAC training information will be integrated in the WE&T web portal when it is launched).

iv. Program-specific marketing and outreach efforts

Co-branded marketing support for participating contractors will be necessary to advance Statewide QI/QM efforts. Such support may include exclusive

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promotion on IOU websites, brochures, and other leave-behind materials that contractors can use to promote QI/QM and their involvement with the program. Additional general promotional materials such as point-of-sale displays for equipment dealers will also be developed. (Specific IOU budget information for this marketing activity is provided in Table 1, above.)

v. Non-energy activities of program

The direct energy benefits of the program result from the quality installation and maintenance of HVAC systems. Other activities will be required to support these energy savings goals. These activities include significant efforts in program design and coordination, technology evaluation and integration, contractor training and consumer marketing.

vi. Non-IOU programs

The program will remain engaged with CEC, the California Air Resources Board (CARB), DOE, and other government agencies responsible for regulating various aspects of HVAC equipment, HVAC industry-driven initiatives such as NATE and the HVACR & Plumbing Instructors Workshop, and private/public partnerships such as SkillsU.S.A.

vii. CEC work on PIER

The program will interact extensively with the Emerging Technologies Program to ensure the proper focus on remote and on-board diagnostic equipment. Such efforts are already underway with the PIER Program. This activity will primarily be managed under the Technology and System Diagnostics Advocacy Program (see the sub-program PIP for more details).

viii. CEC work on Codes and Standards

See Section 6.b.ii., above.

ix. Non-utility market initiatives

The tenets of QI/QM are being actively pursued by leaders in the HVAC industry itself. ACCA has taken the lead in this national effort by developing various ANSI-recognized QI/QM standards. These standards have been widely adopted throughout the industry (e.g., AHRI, ASHRAE, CEE, ENERGY STAR®, Utilities, etc.) Other organizations have also developed processes designed to improve the operating efficiency of HVAC systems (e.g., SMACNA, NCI). The IOUs will remain engaged in these efforts and work to influence the development of increasingly higher standards.

c) Best Practices

The Statewide HVAC Program demonstrates several examples of programmatic best practices. First, the program involves the HVAC industry in all aspects of the program including public policy, program design and implementation – both formally through the HVAC Industry Leadership Task Force and informally through various ad-hoc working groups. Industry involvement is a crucial step in achieving the

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desired market transformation goals. Second, the program uses an adaptive management process, as described in Section 6.a., above, to ensure that the program is responsive to the changing market environment. Included under this process are formal inter-utility coordination meetings between HVAC, Emerging Technologies and Codes and Standards program managers to ensure these three programs are well coordinated and implemented consistent with the goals of the Strategic Plan. Finally, the program includes the appropriate level of focus on technology issues through the Technology and System Diagnostics Advocacy sub-program. This sub-program takes an active role in advancing the various technological and policy issues required to meet the deep energy savings and demand reduction goals of the Strategic Plan.

d) Innovation

The Statewide HVAC Program takes an innovative approach to program design through its implementation of a multi-faceted effort to engage all levels of the HVAC value chain. Each sub-program under the core umbrella is designed to influence specific market changes. Within the sub-programs themselves, innovative techniques such as co-branded marketing and workforce training through existing industry channels will be employed to increase the program's effectiveness. In addition, technical innovation is achieved specifically through a dedicated advocacy effort to advance the state of the art in vapor compression cooling and fault detection and diagnostics (see the Technology and System Diagnostics Advocacy sub-program PIP for more information).

e) Integrated/coordinated Demand Side Management

As with most HVAC-oriented programs, the primary source of integration exists between energy efficiency and demand response activities. At a minimum, all marketing materials developed to support QM will cross-promote DR to educate customers on the availability of IOU DR programs. The required contractor training will be designed to include a discussion on DR programs and participating contractors will be required to deliver DR information as part of their customer sales efforts. Finally, contractors will be encouraged to facilitate the customer's participation in DR programs by providing a completed DR program application to the system owner at the completion of the maintenance service. Additional work will take place during the 2009-2011 program cycle to evaluate closer linkages between EE and DR.

f) Integration across resource types (energy, water, air quality, etc)

The program can be designed to support CARB's efforts to regulate greenhouse gases (GHGs) by providing consumer information on the phase-out of existing refrigerants and the move to zero ozone depletion potential refrigerants with the customer's maintenance invoice. Such information will seek to influence the customer's adoption of newer equipment by explaining the likelihood of increased maintenance costs as existing refrigerants become less available.

g) Pilots

As with any good product/program design, pilots are needed to test the concept before full-scale launch. Each individual sub-program may use pilots to test the

HVAC: Residential and Commercial HVAC Program

implementation of program concepts, processes and the integration of ever increasing QI/QM standards.

h) EM&V

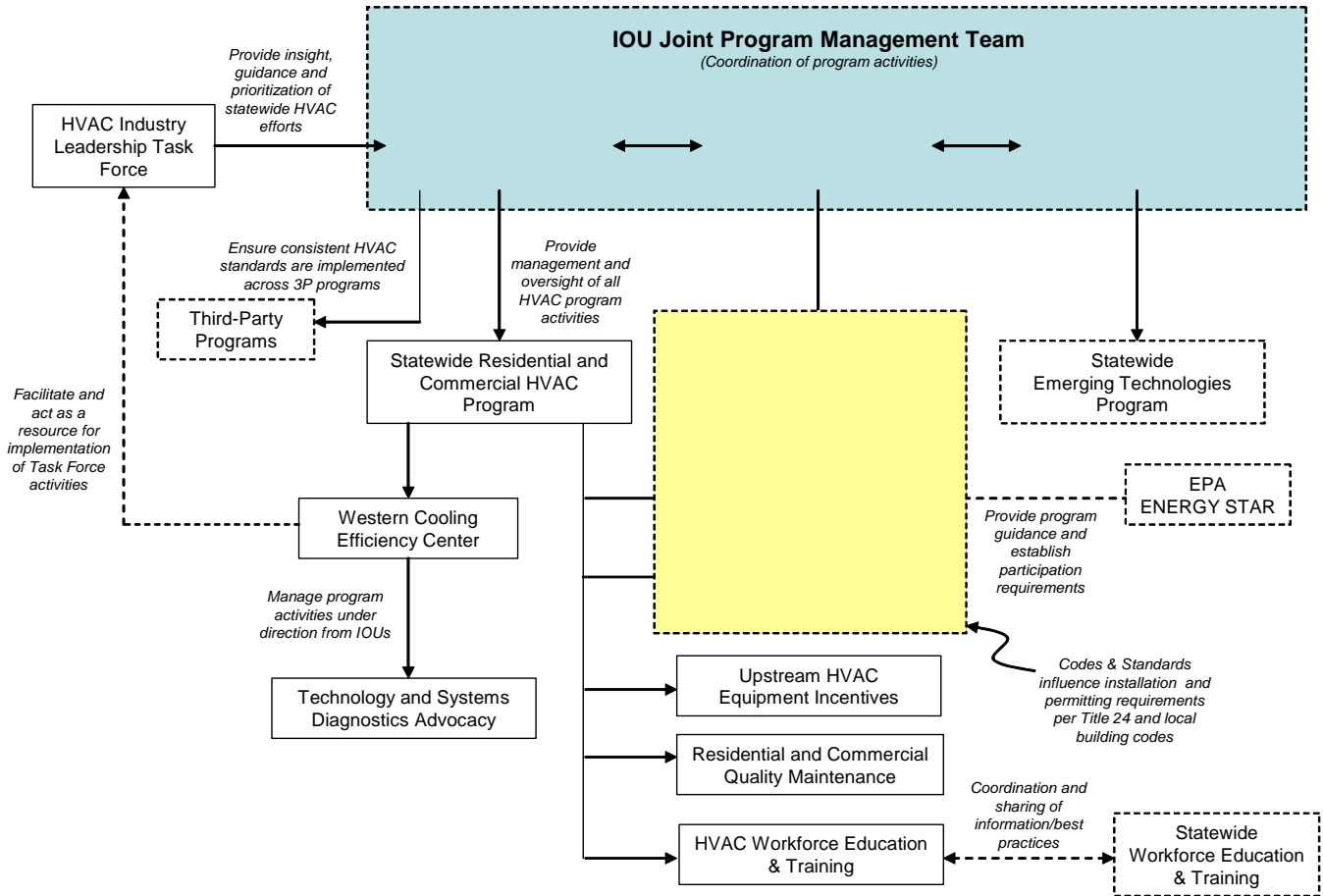
To support the continuous improvement envisioned by the adaptive management process and to fully address the intricacies of the program design, a routine evaluation process will be established that will allow for continuous EM&V to provide timely feedback on the effectiveness of program implementation tactics. Detailed plans for process evaluations and other evaluation efforts specific to this program will be developed after the final program design is approved by the CPUC and program implementation has begun, since final plans will be based on identified program design and implementation issues and questions. However, a brief description of the current, preliminary plans is provided here:

In each of the sub-program plans for the Residential and Commercial HVAC Program, we have provided overview descriptions of evaluation work relevant to either program implementation issues (process evaluation, primarily), or estimation of useful program progress/market transformation indicators. In two cases, the program as planned begins with assessment activity that essentially (and appropriately) delays the beginning of program implementation itself, while properly orienting the program in order to address the goals outlined in the Strategic Plan. In another case (HVAC Technologies and System Diagnostics Advocacy Program), a very complex collection of activities with indirect efficiency resource implications are to be managed by WCEC, and, as we indicate in the sub-program EM&V section, we expect that clearer definition of the evaluation plan will properly emerge from the process in which WCEC and other bodies sort through the many and varied elements of this advocacy/research program.

Note that in any case involving either installation, maintenance, or training activity, we expect that some level of tracking database will be required in order to effectively evaluate the sub-program.

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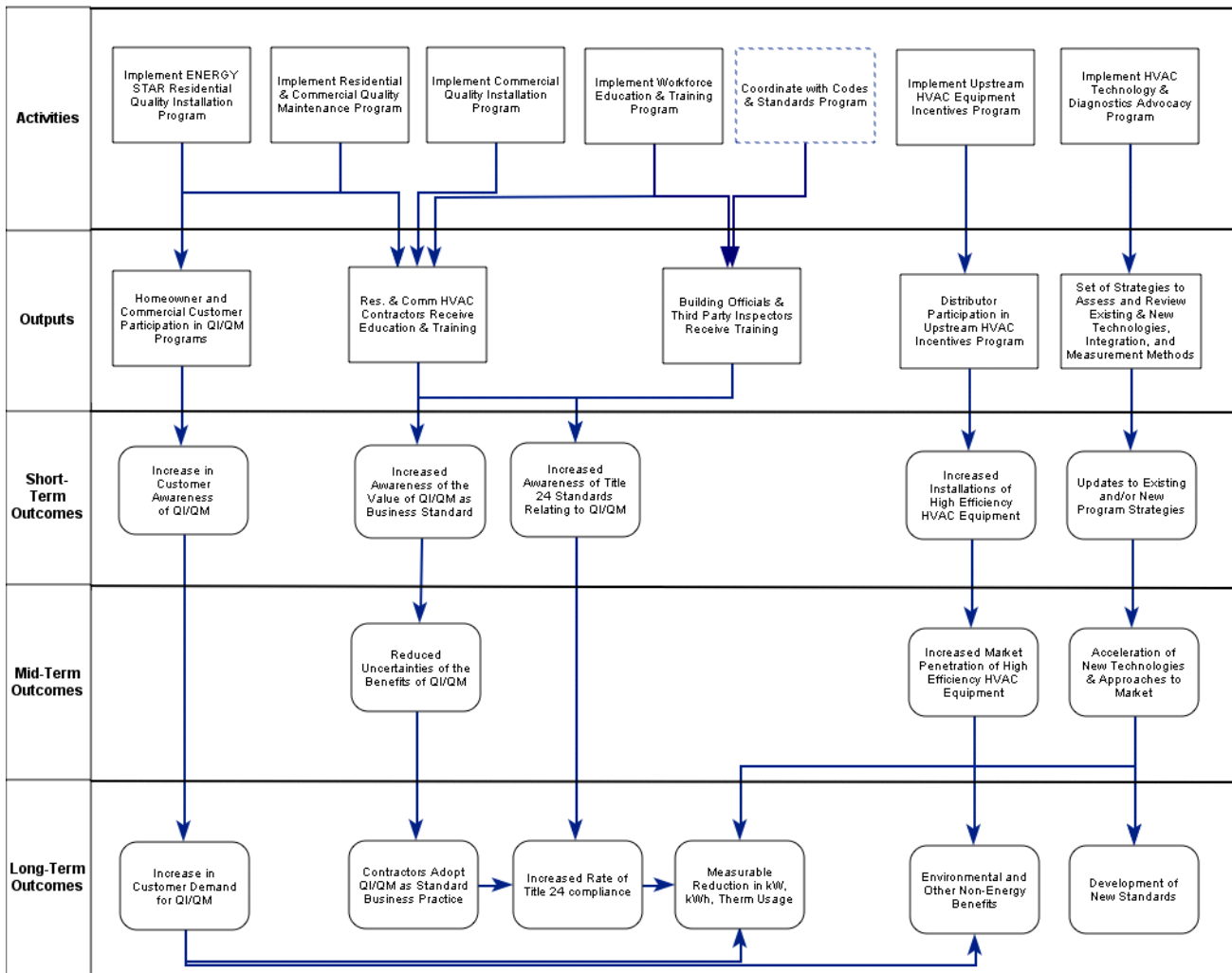
7. Diagram of Program



HVAC: Residential and Commercial HVAC Program

8. Program Logic Model

Program: Residential & Commercial HVAC Program (Core Program)



HVAC: Residential and Commercial HVAC Program

List of Acronyms – Statewide Residential and Commercial HVAC Program	
AABC	Associated Air Balance Council
ACCA	Air Conditioning Contractors of America
ACTA	Air Conditioning Trade Association
AHRI	Air-Conditioning, Heating & Refrigeration Institute
ANSI	American National Standards Institute
ASHRAE	American Society of Heating, Refrigerating & Air-conditioning Engineers
BBEES	Big Bold Energy Efficiency Strategies
CAC	Central Air Conditioner
CARB	California Air Resources Board
CARE	Council of Air Conditioning & Refrigeration Educators
CEC	California Energy Commission
CEE	Consortium for Energy Efficiency
Strategic Plan	California Long Energy Efficiency Strategic Plan (also see Strategic Plan)
CEUs	Continuing Education Credits
Strategic Plan	California Long-term Energy Efficiency Strategic Plan (also see Strategic Plan)
CPUC	California Public Utilities Commission
DG	Distributed Generation
DOE	U.S. Department of Energy
DR	Demand Response
DSM	Demand Side Management
EE	Energy Efficiency
EER	Energy Efficiency Rating (steady state)
GHGs	Green House Gases
HARDI	Heating, Airconditioning & Refrigeration Distributors International
HERS	Home Energy Rating System
HVAC	Heating, Ventilation & Air Conditioning
HVACR	Heating, Ventilation, Air Conditioning & Refrigeration
ICE	Industry Competency Exam
IHACI	Institute of Heating & Air Conditioning Industries
IPLV	Integrated Part Load Value
IOUs	Investor Owned Utilities
IUOE	International Union of Operating Engineers
LADWP	Los Angeles Department of Water & Power
MCAA	Mechanical Contractors Association of America
MSCA	Mechanical Service Contractors of America
NATE	North American Technician Excellence
NCI	National Comfort Institute
NBC	National Balancing Council
NEBB	National Environmental Balancing Bureau
ODP	Ozone Depletion Potential
PAHRA	Partnership for Air-Conditioning, Heating, Refrigeration Accreditation

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List of Acronyms – Statewide Residential and Commercial HVAC Program	
PHCC	Plumbing-Heating-Cooling Contractors Association
PIP	Program Implementation Program
POUs	Publicly Owned Utilities
QI	Quality Installation (an ANSI approved standard)
QI/QM	Quality Installation/Quality Maintenance (slang combining ANSI standards)
QM	Quality Maintenance (ANSI approved standards)
RSES	Refrigeration Service Engineers Society
SEER	Seasonal Energy Efficiency Rating
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SMUD	Sacramento Municipal Utility District
SMWIA	Sheet Metal Workers International Association
STAR	STAR Certification (developed by UA and Ferris State University, also used by MCAA and MSCA)
TABB	Testing, Adjusting & Balancing Bureau
UA	United Association (of Journeymen & Apprentices of the Plumbing & Pipe Fitting Industry of the United States & Canada)
VSPs	Verification Service Providers
WCEC	Western Cooling Efficiency Center
WE&T	Workforce Education & Training

7a

HVAC: Upstream HVAC Equipment Incentive

- 1. Program Name:** Upstream HVAC Equipment Incentive
Program Type: Core

- 2. Projected Program Budget Table**

Table 1 - reference the core program for budget details

- 3. Projected Program Gross Impacts Table – by calendar year**

Table 2 - reference the core program for projected gross impact details

- 4. Program Description**

- Describe program**

This sub-program offers incentives to distributors who sell qualifying high-efficiency HVAC equipment. The logic that underscores this sub-program's design is that a small number of distributors and manufacturers are in a position to impact thousands of customers and influence their choice of equipment by increasing the stocking and promotion of high-efficiency HVAC equipment. Upstream HVAC cost-effectively leverages this market structure and existing relationships. The sub-program also provides an online incentive application system to facilitate distributor sales and invoice tracking, which further reduces administrative costs as compared with paper application processing. The installation aspects of equipment included in this program are addressed in the separate ENERGY STAR® Residential Quality Installation Program and Commercial Quality Installation Program PIPs.

- List measures**

Eligible measures include packaged and split-system air conditioners and heat pumps. Units less than 65,000 Btu/hour are rated according to seasonal energy-efficiency rating (SEER) and steady state energy efficiency rating (EER). Units greater than 65,000 Btu/hour are rated according to EER and integrated part-load value (IPLV). See the table below for minimum qualifying efficiency ratings for each size category and corresponding incentive values. It is acknowledged that the table below currently does not include any gas equipment/measures. Gas measures will be included in the program upon further evaluation of their viability and cost-effectiveness. This evaluation will occur through such ongoing national efforts as those of the Consortium for Energy Efficiency's Residential and Commercial HVAC.

Minimum Efficiency Requirements and Incentive Levels

Equipment Type	Size Category	Sub Category	Tier 1	Tier 2	Tier 3
Air Conditioners and Heat Pumps, Air Cooled, Three Phase	<65kBTuh	Split System x/TXV	12.0 EER or 14.0 SEER \$90/ton incentive	12.5 EER or 15.0 SEER \$150/ton incentive	13.0 EER or 16.0 SEER \$450/ton incentive
		Single Package	11.6 EER or 14.0 SEER \$90/ton	12.0 EER or 15.0 SEER \$150/ton	12.4 EER or 16.0 SEER \$450/ton

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Equipment Type	Size Category	Sub Category	Tier 1	Tier 2	Tier 3
			incentive	incentive	incentive
	≥65,000 Btuh and <135,000 Btuh	Split System and Single Package	11.0 EER or 11.4 IPLV \$85/ton incentive	11.5 EER or 11.9 IPLV \$110/ton incentive	12.0 EER or 12.4 IPLV \$150/ton incentive
	≥135,000 Btuh and <240,000 Btuh	Split System and Single Package	10.8 EER or 11.2 IPLV \$85/ton incentive	11.5 EER or 11.9 IPLV \$110/ton incentive	12.0 EER or 12.4 IPLV \$132/ton incentive
	≥240,000 Btuh and <760,000 Btuh	Split System and Single Package	10.5 EER or 10.9 IPLV \$85/ton incentive	10.8 EER or 12.0 IPLV \$110/ton incentive	-
	≥760,000 Btuh	Split System and Single Package	9.7 EER or 10.1 IPLV \$85/ton incentive	10.0 EER or 11.0 IPLV \$110/ton incentive	10.2 EER or 11.0 IPLV \$150/ton incentive
Air Conditioners and Heat Pumps, Water and Evaporatively Cooled, Three Phase	<65,000 Btuh	Split System and Single Package	14.0 EER \$500/ton incentive	-	-
	≥65,000 Btuh and <135,000 Btuh	Split System and Single Package	14.0 EER \$500/ton incentive	-	-
	≥135,000 Btuh	Split System and Single Package	14.0 EER \$265/ton incentive	-	-
Air Conditioners and Heat Pumps, Air Cooled, Single Phase	<65,000 Btuh	Split System	12.0 EER and 14.0 SEER \$75/ton incentive	-	-
		Single Package	11.0 EER and 14.0 SEER \$75/ton incentive	-	-

c) List non-incentive customer services

Pending the outcome of the HVAC Residential Quality Maintenance and Commercial Quality Maintenance effort (see the sub-program PIP below for more information), the Upstream HVAC Equipment sub-program will explore combining inspections with maintenance services for additional HVAC equipment on the rooftop, but no non-incentive customer services are available at this time.

5. Program Rationale and Expected Outcome

a) Quantitative Baseline and Market Transformation Information

By its nature, market transformation occurs as a result of numerous factors and programs, not single sub-programs. Therefore, all metrics are proposed at the program level. Please refer to the quantitative baseline and market transformation discussion, presented in the overall program PIP.

Table 3 – Refer to the overarching program for quantitative baseline metrics

b) Market Transformation Information

By its nature, market transformation occurs as a result of numerous factors and programs, not single sub-programs. Therefore, all metrics and goals are proposed at the program level. Please refer to the quantitative baseline and market transformation discussion, presented in the overall program PIP.

Table 4 – Refer to the overarching program for market transformation metrics

c) Program Design to Overcome Barriers

The program will overcome the following priority barriers:

- Lack of information, time, and resources to assess customer's own energy efficiency opportunities.
- Limited facility staff in small businesses, lack of a dedicated energy manager and limited time to research energy efficiency and its benefits.
- Limited time and budgets for selecting contractors and verified service providers to implement energy efficiency measures and projects.

The program is designed to overcome these priority barriers by utilizing the Upstream/Midstream delivery channel, which has the following benefits:

- The delivery process is streamlined. Delivery through contractors, verification service providers (VSPs), distributors, retailers, and manufacturers will provide consistent information on the benefits of energy efficiency.
- The Upstream/Midstream incentives ensure product availability to influence the decision maker at the time of purchase or service.
- Delivery through knowledgeable, verified service providers, retailers, manufacturers, and contractors reduces the need for end-user analysis, thus allowing more customers to see the benefits of implementing energy efficiency projects and measures.
- The Upstream/Midstream incentive channel controls incentive availability to the most relevant segments to maintain cost-effectiveness.
- Smaller per-unit incentives through the Upstream/Midstream channels maintain cost-effective standards and reach a larger number of customers.
- Midstream/Upstream incentives to manufacturers and retailers encourage the development and promotion of new energy efficiency technologies and tiered incentive structure to build toward meeting future codes and standards changes

d) Quantitative Program Targets

The program will work towards achieving the following targets over the 2009-2011 program cycle. The proposed targets may be modified due to funding restrictions, especially for the 2009 bridge funding year.

HVAC: Upstream HVAC Equipment Incentive

Table 5

Program Name	Program Target by 2009	Program Target by 2010	Program Target by 2011
Tons Incentivized	18,000	20,000	22,000

e) Advancing Strategic Plan goals and objectives

One of the goals of the Strategic Plan is to increase the market penetration of new climate-appropriate HVAC technologies to 15% of equipment shipments by 2015. The Strategic Plan recommends several strategies to accomplish this including:

- Develop a regional (southwest) strategy to develop new technology designed for hot/dry climate conditions;
- Commercialize on-board diagnostic systems;
- Support incremental improvements to HVAC equipment; and
- Quality installations.

Both SMUD, and NV Energy (formerly Nevada Power and Sierra Pacific) currently offer a similar Upstream HVAC program. The California Upstream HVAC Program will look to leverage these existing relationships in addition to engaging the DOE, Southwest Energy Efficiency Project (SWEET), WCEC, and manufacturers to create a regional strategy to develop and increase the commercialization of new climate-appropriate HVAC technologies, such as on-board diagnostic systems and advanced packaged rooftop HVAC units. The Upstream HVAC sub-program will serve as an incubator program for increasing the market penetration of promising HVAC technologies.

The sub-program will also greatly support incremental improvement to HVAC equipment immediately by providing incentives in January 2009 for various high-efficiency HVAC equipment categories. The eligible equipment categories are based on the Consortium for Energy Efficiency HVAC specifications, which have multiple tiers designed to increase the market share of high-efficiency equipment. Furthermore, by leveraging the geographic area of the Upstream HVAC sub-program throughout California and Nevada, the result will be increased distributor participation, which will lead to increased market share of high-efficiency equipment sufficient to argue for standards changes. The sub-program will also recruit other California utilities, specifically the Los Angeles Dept. of Water and Power (LADWP), to implement a similar Upstream HVAC program.

Finally, most HVAC distributors and manufacturers have not actively engaged in the area of quality installations. However, they are supplying the contractors who are in the best position to achieve quality installations. The program can continue to engage these market actors for ideas and program modifications to promote their support of quality installations. As newer technology and techniques arise that can impact this area, this channel can become an avenue of support or inclusion of the new technology or techniques.

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6. Program Implementation

a) Statewide IOU Coordination

The IOUs will be delivering this sub-program through a common third party implementer, who also manages similar upstream programs for SMUD and NV Energy.

i. Program name: Upstream HVAC Equipment Incentive Program.

ii. Program delivery mechanisms

The three IOUs and SMUD will offer upstream HVAC distributor incentives which use the same online participation process. Other IOUs and POU will be approached and offered participation.

iii. Incentive levels

The three IOUs will offer the incentive levels shown in Section 4.b., above, and will coordinate with SMUD to make every effort to make incentive levels consistent Statewide.

iv. Marketing and outreach plans

The sub-program will coordinate outreach activities to distributors in other geographic areas that ship into and across service territories and will continue communication with the industry to see where additional collaboration can occur to maximize marketing and outreach resources

v. IOU program interactions

The IOUs are engaged in communication with the CEC and other agencies via the codes and standards process and will be able to coordinate and communicate voluntary programs and incentives with mandatory codes that become enacted for the future. Increasing the communication regarding the Strategic Plan will allow all entities to move and plan towards the same objectives.

vi. Similar IOU and POU programs

As mentioned in Section 6.a.ii., above, the three IOUs and SMUD will be implementing the same Upstream HVAC Equipment Program. Additional efforts to coordinate with other POU will occur to establish this program as a true Statewide effort.

b) Program delivery and coordination

The Program will be coordinated with the following activities:

i. Emerging Technologies program

As Emerging Technologies identify new technology which should be included in the portfolio, an incentive level and any supplemental marketing can be included for this technology via this program design.

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ii. Codes and Standards program

As technologies advance and market penetration increases to an acceptable level, the minimum threshold for eligibility in California can increase to lock in the higher efficiency levels and continue an upward level of efficiency for HVAC equipment.

iii. WE&T efforts

The IOUs will leverage distributor relationships established through this program to deliver training modules developed through the HVAC WE&T Program and the Codes & Standards Program.

iv. Program-specific marketing and outreach efforts (provide budget)

The primary vehicle for outreach between the Program and participating distributors is the website: www.cainstantrebate.com. The cost of operating this website is shared among the participating IOUs and POUs. Additional marketing and outreach activities exist through personal contact between the program staff and participating distributors. Targeted QI/QM marketing materials can be distributed to contractors via these established distributor channels.

v. Non-energy activities of program

N/A.

vi. Non-IOU programs

The sub-program will leverage its involvement with the WCEC to continually evaluate and include new equipment technologies as they become more commercially viable.

vii. CEC work on PIER

See Section 6.b.vii., above.

viii. CEC work on Codes and Standards

See Section 6.b.ii., above.

ix. Non-utility market initiatives

N/A.

c) Best Practices

In the fall of 2007, ACEEE awarded the “Exemplary” Award to the Upstream Program design implemented by PG&E. This award designated that program model as the highest-performing program to promote HVAC equipment, compared to all programs across the United States.

d) Innovation

A critical component of this sub-program is its use of a web-based application and participation tool that provides to both participating distributors and the host IOU the ability to see what is occurring for applications that involve them. Allowing

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participants to know the status, in aggregate or down to the customer application level, makes participation easy and efficient. For distributors, a paperless participation system is critical for ease of participation; for utilities, the system reduces cost per kWh saved more than a paper review process would. This approach is innovative because no other programs are using a similar online application tool.

e) Integrated/coordinated Demand Side Management

While the initial rollout of this sub-program will not have a strong integration component, the potential for including and incentivizing equipment that increases the ability of the equipment to be included in DR programs is readily apparent. Manufacturer equipment with built-in controllability via wireless or powerline carrier or other could be integrated relatively easily, once the appropriate incentives and messaging are determined.

f) Integration across resource types (energy, water, air quality, etc.)

N/A.

g) Pilots

N/A.

h) EM&V

Detailed plans for process evaluations and other evaluation efforts specific to this program will be developed after the final program design is approved by the CPUC and program implementation has begun, since final plans will be based on identified program design and implementation issues and questions. However, a brief description of the current, preliminary plans is provided below:

Routinized evaluation: The sub-program will use the online incentive application system to track the sale of high-efficiency equipment from year to year. Reports can then be created to show the percent of equipment, incentivized in tons, based on SEER or EER. These reports will be prepared every year and compared to the previous accomplishments, and will determine whether the program is achieving the goals set forth in Table 4 and 5, above.

The evaluation of this sub-program will also entail yearly surveys of distributor stocking practices, starting with an immediate baseline survey. Through a combination of telephone and on-site surveys, the commercial HVAC high-efficiency share will be estimated for appropriately designed samples of distributors. The overall high-efficiency stocking percentage, as one example of the parameters estimated in this process, will be obtained by appropriately weighting the sample results, taking into sample site share of overall distributor stock, and distributor market share.

In addition to tracking and providing feedback to the program with respect to market share and stocking practice changes, a number of issues may be addressed via process evaluation, conducted throughout the 2009-2011 program cycle. The process

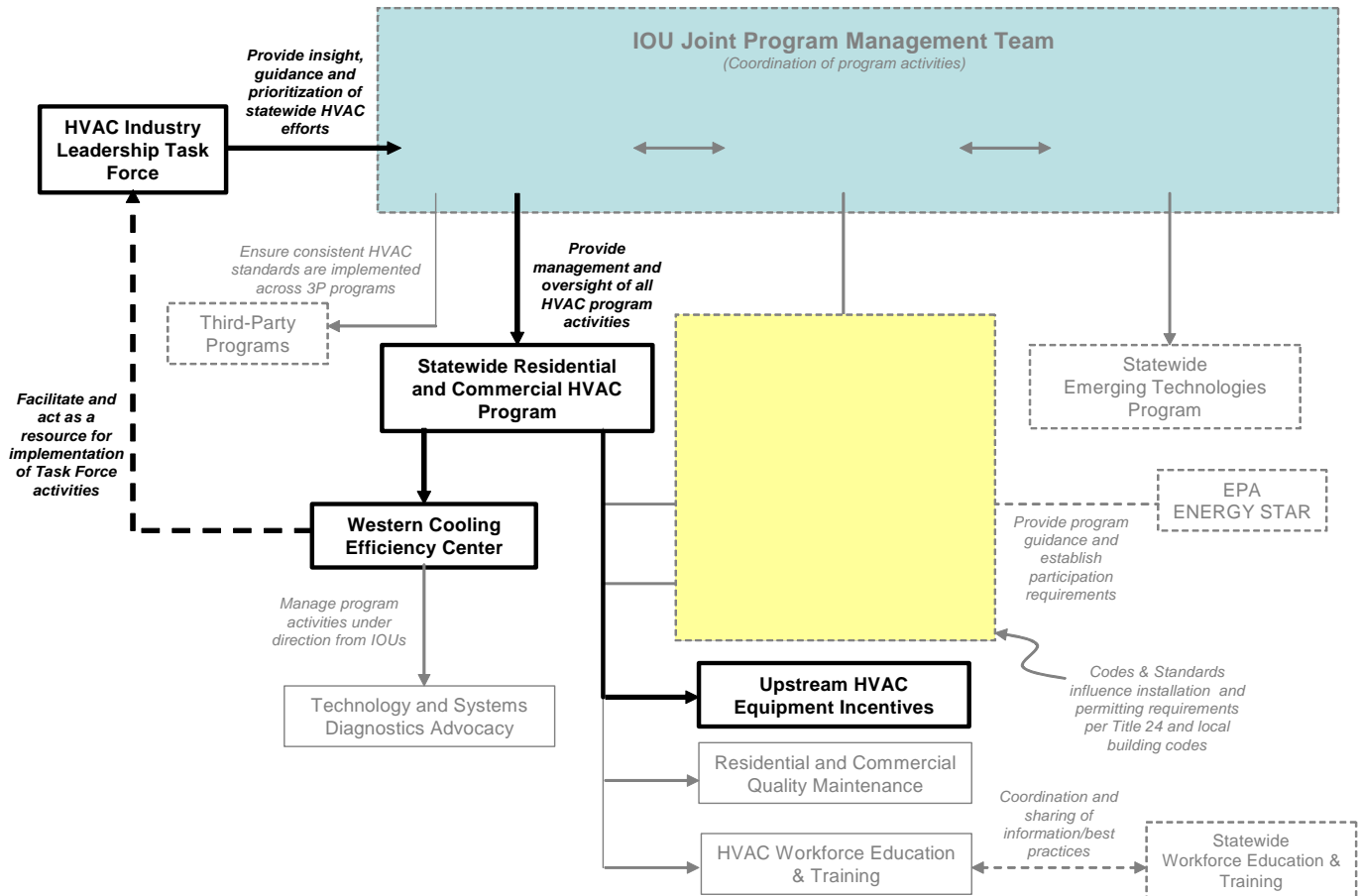
HVAC: Upstream HVAC Equipment Incentive

evaluation work will provide feedback on the effectiveness of the numerous linkages between organizations connected to the program, and address certain key connections or correlations that ought to occur if the program theory holds. Key issues that are to be addressed include:

- Lessons learned from dealers and customers with respect to the online rebate application system, including reliability, amenability of smaller dealers to the system, and promptness on rebates.
- Ongoing customer reports on the salience of the incentive relative to other key equipment features or transaction characteristics, potentially guiding incentive adjustments.
- Survey evidence from customers and dealers regarding market barrier reduction. For example, one would expect that, if the program operates by reducing the effect of information asymmetries affecting small businesses without energy managers, this would be borne out under questioning.
- The effectiveness of coordinated multi-utility dealer outreach and recruitment.
- The degree to which the program and dealers are able to adapt to changes in code efficiency.
- Effectiveness of collaboration with DOE, SWEEP, WCEC, and manufacturers, in furthering the development and commercialization of California-appropriate technological advances, including on-board diagnostic systems.
- Collection and synthesis of market player and regulatory viewpoints on program effectiveness, particularly with respect to the program's market share impacts and possible consequent impacts on standards changes.

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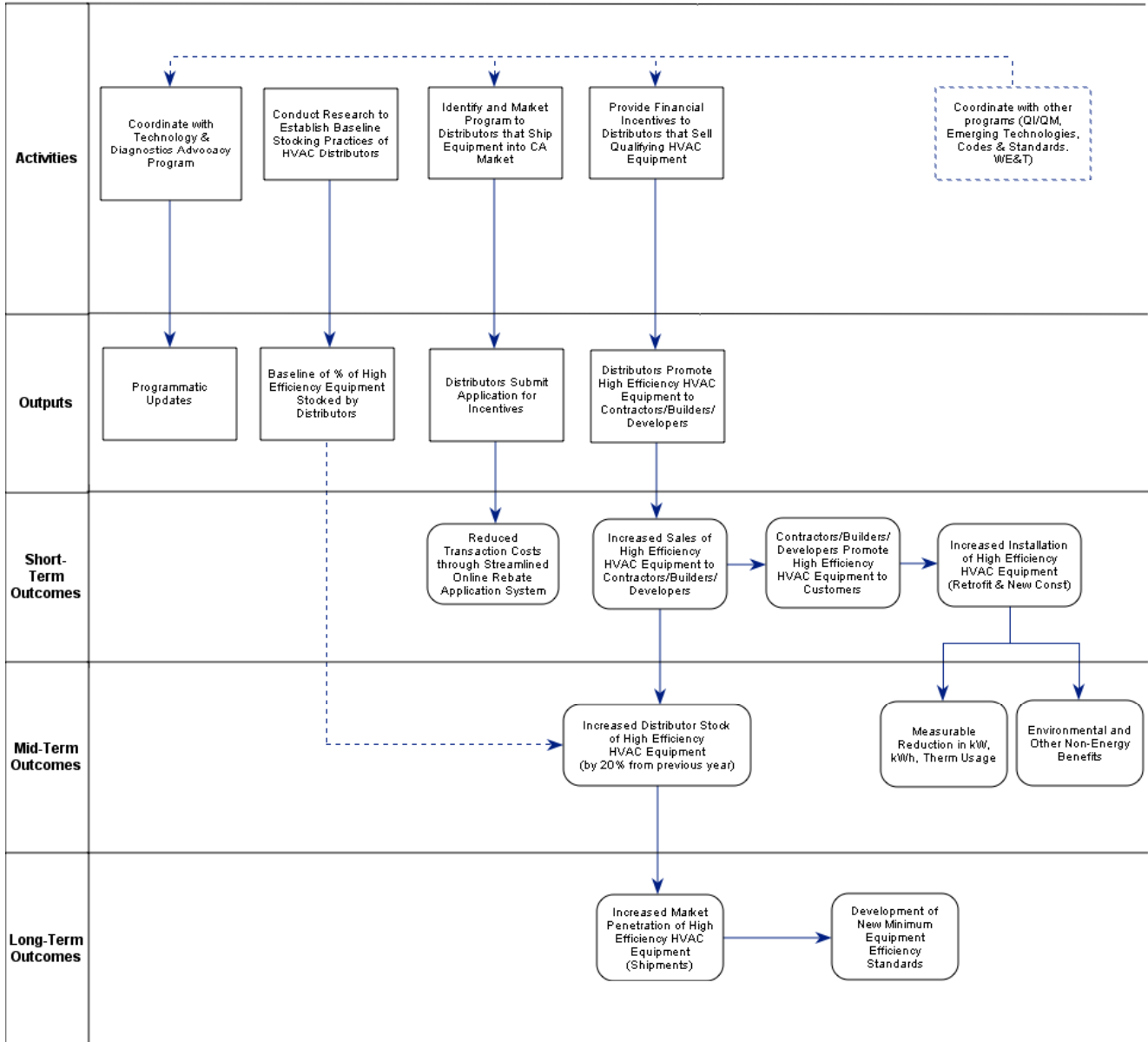
7. Diagram of Program



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8. Program Logic Model

Program: Residential & Commercial HVAC Program
Sub Program: Upstream HVAC Equipment Incentives Program



7b

HVAC: HVAC Technologies and System Diagnostics Advocacy

1. Program Name: HVAC Technologies and System Diagnostics Advocacy
Program Type: Core

2. Projected Program Budget Table

Table 1 - reference the core program for budget details

3. Projected Program Gross Impacts Table – by calendar year

Table 2 - reference the core program for projected gross impact details

4. Program Description

a) Describe program

HVAC Technologies and System Diagnostics Advocacy is a coordinative and advocacy program that addresses the priority need for immediate and comprehensive action addressing elements critical to increasing, optimizing and maintaining the energy and peak electricity efficiency performance of direct expansion (DX)/vapor-compression-based cooling equipment and accelerating the market introduction of a range of advanced evaporative-based cooling technologies. The sub-program will be implemented by the Western Cooling Efficiency Center (WCEC) and funded by the IOUs, and includes unprecedented participation by HVAC industry stakeholders in research, development, and design, continuous review and updating, and operation of HVAC-related IOU programs. This unprecedented cooperation and collaboration with the HVAC industry has the purpose of substantially advancing HVAC-related program quality and effectiveness. A continuous program improvement process will be introduced to provide an active, real-time means for improving program effectiveness and incorporating results between planning cycles.

The sub-program's results and benefits will include (1) providing higher levels of HVAC energy/demand efficiency in equipment design, installation, operation, maintenance, (2) improving quality assurance throughout the HVAC supply chain, (3) providing up-to-date workforce education and training content, and (4) supporting improved compliance with current and yet-to-be-proposed advanced codes and standards in California.

b) List measures

This sub-program is primarily a non-resource program focused on technical and policy issues, but may provide incentives to assist in the commercialization of new technologies (modeled on “Golden Carrot”-type programs such as the Super Efficient Refrigerator Program of the early 1990s²¹). Cost-sharing from other in- and out-of-state partners will be sought on all projects as appropriate.

²¹ Note that the sector report to the HVAC section of the Strategic Plan specifically called for such "Golden Carrot" programs as a means to encourage manufactures to include on-board diagnostic systems on HVAC equipment.

c) List non-incentive customer services

Resolution of technical issues will also directly support the HVAC-related Zero Net Energy (ZNE) goals in an integrated manner through substantiating the benefits of combining the highest efficiency, most fully featured equipment with robust maintenance practices. Approaching ZNE goals in the residential and small commercial sectors requires the identification, assessment, availability, and implementation of new building designs, construction materials, lighting, and HVAC equipment, and a change in service practice. Of necessity, where mechanical cooling is needed, equipment requirements for ZNE buildings must include the most efficient, robust vapor-compression/DX cooling technology along with advanced evaporative cooling approaches and hybrids of the two system types, applied and sized appropriately. The road to ZNE consists of many technical improvement steps, ranging from small to large, including climate-optimized and control-optimized systems.

5. Program Rationale and Expected Outcome

a) Quantitative Baseline and Market Transformation Information

By its nature, market transformation occurs as a result of numerous factors and programs, not single sub-programs. Therefore, all metrics are proposed at the program level. Please refer to the quantitative baseline and market transformation discussion, presented in the overall program PIP.

Table 3 – Refer to the overarching program for quantitative baseline metrics

b) Market Transformation Information

By its nature, market transformation occurs as a result of numerous factors and programs, not single sub-programs. Therefore, all metrics and goals are proposed at the program level. Please refer to the quantitative baseline and market transformation discussion, presented in the overall program PIP.

Table 4 – Refer to the overarching program for market transformation metrics

c) Program Design to Overcome Barriers

This is a multifaceted program involving a combination of advocacy work on standards, market advancement of existing technologies, advocacy for building codes that support efficient equipment, research/advocacy supporting specifications for onboard diagnostics and sensor mounting, prioritization of diagnostic/maintenance procedures. This description does very little justice to the complexity of the tasks to be undertaken, and the web of relationships between private and public organizations that will be involved. The management of this coordinative/advocacy program is to be performed by Western Cooling Efficiency Center. Given the variety of activities, and the obvious potential for reorganization/prioritization of the projects and activities, it is difficult to specify a small, definite set of baseline metrics, planning estimates, and program targets at this time. However, this work should be completed early in 2009, with involvement by the WCEC, funding utilities, regulators, and the

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HVAC Industry Leadership Task Force. The metrics and quantitative goal settings should be a byproduct of a more general review and prioritization by the WCEC.

The sub-program will address the following priority barriers:

- Lack of accurate and easy-to-use diagnostic tools to improve system performance and service quality in RCA programs;
- Lack of HVAC equipment that provides more robust field performance;
- Lack of climate-optimized cooling equipment;
- Limited use by HVAC contractors of emerging industry standards to improve installation and maintenance practice;
- Limited understanding of consumers about cooling equipment efficiency; and
- Lack of specific industry standards that support increased field performance, diagnostics and service of equipment.

These barriers will be addressed through a prioritized, integrated, multi-level approach that directs increased attention and resources to increasing technical excellence, financial accountability, and IOU program effectiveness, as further described in Section 5.e., below.

d) Quantitative Program Targets

Table 5

Program Name	Program Target by 2009	Program Target by 2010	Program Target by 2011
	NA	NA	NA

e) Advancing Strategic Plan goals and objectives

This sub-program directly addresses the Goal 4 objectives outlined in Chapter 6 of the Strategic Plan and is aimed at substantiating effective technical approaches to the installation, maintenance and servicing of residential and small commercial HVAC systems that deliver reliable energy and demand savings. Completion of the individual technical components outlined below²², and others that will surface during and beyond the 2009-2011 program cycle, will solve fundamental issues that have hindered significant advancements in the HVAC industry and provide state-of-the-art content to the HVAC WE&T effort. The sub-program will achieve its objectives by expanding opportunities for HVAC industry participants to become involved in the design and implementation of IOU HVAC programs. This will increase the overall credibility and effectiveness of the entire suite of HVAC programs.

Strategy 4-1 – Pursue regional climate-optimized equipment standards through DOE rulemaking process.

²² This section is only intended to illustrate a number of energy-efficiency related issues that exist within the industry at the time of this writing. The IOUs do not explicitly support or endorse any of the technical approaches, issues or products discussed in this PIP. Funding may be provided to resolve these or similar issues and will be evaluated by the IOUs with the support of the HVAC Industry Leadership Task Force.

4.1.1 The IOUs, in close consultation with WCEC/CEC and other appropriate parties, will continue to stay attentive to and engaged in the federal climate-optimized cooling standard proceeding as it continues into 2011. The IOUs and WCEC will reach out to utilities including Arizona Public Service, Nevada Power (already involved through the PIER hot dry A/C project), New Mexico Public Service, Salt River Project and others to ensure that these utilities are also engaged in the federal rulemaking. The Northwest Energy Efficiency Alliance, Bonneville Power Administration and the Energy Trust of Oregon are other important allies that will be contacted. Formal IOU comments to the proceeding will be shared with these organizations, potentially with multiple companies signing on in support of the comments. A formal liaison will be assigned as the rulemaking proceeds to ensure timely involvement as needed. A PG&E Codes and Standards staff person has already been selected to work with the WCEC as the California IOU liaison as the federal rulemaking proceeds.

Sub-program Benefits: With federal preemption limiting California's ability to adopt more stringent cooling standards reflecting climate conditions, a federally-recognized climate-optimized standard could allow higher-efficiency equipment to reach the marketplace without the need for utility incentives.

4.1.2 IOUs will continue to expand the climate-optimized/hot dry cooling work in California through the Emerging Technology (ET) program and pilot program efforts. The results of these activities are critical inputs to the federal climate-optimized standards rulemaking, including technology options, costs, savings, environmental benefits, market interest, and impacts. This sub-program will coordinate with ET activities to ensure the appropriate level of attention on hot dry air conditioning through an inter-utility program management team (consisting of the appropriate program managers from the four IOUs) that meets quarterly to discuss program integration and implementation issues.

Sub-program Benefits: The results will accelerate the deployment of climate-optimized equipment, first in California, then throughout the Southwest region.

Strategy 4-3 – Accelerate market penetration of advanced technologies by HVAC industry promotions and updating/expanding current utility programs to include the new technologies as appropriate.

4-3.1 Western Cooling Challenge. The WCEC has launched the Challenge to establish new high-efficiency RTUs [10-ton prototype] that respond more optimally to the hotter, drier climate conditions in California and in the western regions. Twelve companies are participating with seven Original Equipment Manufacturers (OEMs), two as OEMs and as component suppliers, and three as component suppliers. This activity corresponds to strategic needs for climate-optimized HVAC technology and industry promotion. The IOUs will provide additional financial resources as needed to support or expand the Challenge. Given the limits of vapor-compression/DX-based

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cooling, hybrid systems are a major contender for next generation cooling technology where sufficient water resources are available.

Sub-program Benefits: Completed lab and field-testing indicate that climate-optimized vapor-compression/DX cooling equipment could save up to 20-30% energy and demand in California.

4-3.2 Advanced Rooftop Unit (ARTU). The ARTU was supported as part of PIER's Advanced, Automated Fault Detection and Diagnostics Commercialization program that ended in 2007. The commercial package ARTU includes 36 items that enhance the field performance, maintenance and serviceability of package RTUs. They include the following components: Operational Performance, Maintenance and Serviceability, Reliability and Robustness, and Diagnostics and Monitoring. Many of the features are already found in commercial units, but only in the high-tier, most expensive model lines with the smallest market share. These features need to migrate downward to all RTUs as critical to reaching and maintaining performance efficiency of units in the field. A number of the 'advanced' features are controls-related and have very low marginal cost. The ARTU feature set represents the next evolution in high performance equipment, and as such is a priority for IOU attention.

There is at least one feature in the ARTU feature list that the IOUs will change: the recommendation of Consortium for Energy Efficiency (CEE) Tier 1 (ENERGY STAR®-level) equipment efficiency levels for an ARTU. In 2005, when the project began, CEE Tier 2 equipment was very new to the market. The project's technical advisory group did not anticipate the rapid upward movement of equipment efficiencies chosen for utility incentive programs. Therefore, the ARTU minimum efficiency level must now be placed at the CEE Tier 2 level. The PIER Market Connections activity supporting the ARTU proposed the ARTU to the CEE as a potential "Voluntary Initiative" to be developed and tested by CEE members including, potentially, California IOU CEE members. The ARTU feature set is also being proposed and discussed as the platform for a new tier specification that would apply in addition to the standard SEER/EER/IPLV efficiency metrics.

In order to support and accelerate the CEE Voluntary Initiative, the California IOU CEE members will initiate next steps to move the ARTU forward. These steps include assessment of the benefit-cost of the ARTU features, the design of ARTU feature set tiers in relation to establishing tier options to be promoted through pilot energy efficiency programs that will be designed in 2009, and review of the data from the ARTU testing completed in 2006 at SCE's Refrigeration & Thermal Test Center. This review will indicate whether additional testing protocols and testing is required to validate specific ARTU features. Additional testing protocols will be supported, planned, initiated, and reviewed for potential national advocacy benefits.

Sub-program Benefits: Implementation of ARTU features across RTU model lines would provide a major boost to QI/QM installation and maintenance practices by providing a more robust equipment package that needs less maintenance and is

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equipped with embedded service diagnostics that help technicians achieve quality service standards at less cost and complexity.

4-3.3 Premium Ventilation Package. The Bonneville Power Administration recently funded the Premium Ventilation Package project. The potential for additional savings from the primarily controls-related measures included in the package bear a direct relationship to the future design of RTU service resource programs in California. The measures that will be tested as additions to the AirCare Plus RTU service platform include:

- Optimum start;
- Resistance heat lockout for heat pumps;
- Ventilation lockout during morning warm-up;
- Premium economizer;
- Demand Controlled Ventilation; and
- VSD fan control.

Utility and regional energy efficiency organizations in the Pacific Northwest and the Northeast have been working to establish a technically sound and cost-effective approach to utility-sponsored commercial building RTU service programs for existing RTUs. The regions have been working together on an RTU Savings Research project. Current thinking in the PNW is that the conventional, standard approach to utility RTU service programs that includes refrigeration charge and airflow checking (with airflow the major concern), thermostat replacement/reset (with the largest savings potential and most limited persistence), and economizer repair may not provide sufficient cost-benefit to the ratepayers, the customer, or the HVAC service contractor. The conventional measure package, expanded to include at least some of the Premium Ventilation Package control features, may provide a more cost-effective solution with more substantial energy savings. The IOUs will keep engaged with the Bonneville Power Administration to monitor and participate in project review on an active and ongoing basis. As results are available, the continuous improvement framework described in the core Residential and Commercial HVAC Program will promote the integration of this information into the Quality Maintenance sub-program.

Sub-program Benefits: The Premium Ventilation Package of features, derived in part from the ARTU project, are estimated to save 1950-6700 kWh/year in existing RTU systems.

4.3.4 Residential Low Capacity/Low Flow HVAC Systems. A research, design, development and testing program for the design/installation/operation of the low-capacity/low-flow HVAC systems that are needed in low or zero net energy homes will be established with complete collaboration of whole building sector stakeholders and HVAC equipment manufactures. These homes have small heating and cooling requirements resulting in low air flows (<20 cfm) that current residential HVAC systems are not able to reliably control and supply. More effective controls and control sequences, along with embedded diagnostic capabilities with remote

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performance communications linkages, will have to be integrated with the equipment. Climate-optimized and control-optimized systems will be developed. The financial costs for this effort will be co-funded with financial participation from HVAC OEMs, CEC and other organizations inside and outside California.

Sub-program Benefits: Appropriate technology is required to meet the energy requirements of a new generation of low or zero net energy homes.

4.3.5 Package Unit Retrofit Control Package. Portland Energy Conservation, Inc. (PECI) proposed two activities to the recent PIER Buildings Program RFP that are appropriate for inclusion in the Technology and System Diagnostic Advocacy Program. However, PEGI's overall proposal was rejected by the CEC. PEGI proposed to research and develop a modern retrofit control package with the most efficient and effective economizer sequence, demand management features, integrated start-up checkout, and simplified ongoing fault diagnostics that will make retrofitting rooftop units more reliable and attractive to utility programs. The project will develop a sequence and specification for a control retrofit package with on-board diagnostics intended for existing rooftop package HVAC units. PEGI contacted and plans to work with manufacturers – Honeywell, Ice-Energy, and ICM Corporation – to test an actual prototype that can be commercialized rapidly, resulting in savings potential that can be delivered more reliably and quickly than through the current market process. The developed product will form the basis for following generations of work that may include programmable communicating thermostats, demand controlled ventilation, and variable speed drives. The overall project goals are to develop an expert-sourced specification, create a prototype of an incremental product that can be delivered in a reasonable time frame, determine savings for the product so it can be embraced by utility programs, and promote the technology to energy program managers so it will create market demand. The HVAC Industry Leadership Task Force will review this proposal in detail as part of a roadmap and action plan development. *(Also supports Strategy 4.4).*

Sub-program Benefits: Smarter, small HVAC system controls are beginning to emerge in the market. This project would accelerate the market deployment of advanced control equipment especially through the potential manufacturer partnerships that have been identified.

4.3.6 Advanced HVAC Performance Monitoring Savings Validation. PEGI's other HVAC PIER proposal was aimed at adding a savings validation component to an existing effort encompassing the Statewide deployment of advanced HVAC performance monitoring and fault detection and diagnostics (FDD), and optimized building control technology with Bank of America and Field Diagnostic Services, Inc. (FDSI). Results of the work will be publicly available and useful for informing building owners and operators of the benefits of advanced maintenance approaches. The value proposition is based on leveraging the significant investment already being made by Bank of America in installing an enterprise-level building control system and in adding FDSI's advanced HVAC performance monitoring and optimal building

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control technology. Bank of America is deploying the technology to over 3,200 banking centers across the U.S., including over 400 locations in California. The proposed research project leverages the investment in technology being made by Bank of America, and completes a savings validation that is not part of the current plan. The results of this proposal will be reviewed in detail as part of a roadmap and action plan development and integrated into the Quality Maintenance sub-program as appropriate.

Sub-program Benefits: The availability of results from the use of advanced diagnostic technology by a large corporation across 400 California buildings may provide key lessons for educating building owners about the benefits of advanced maintenance practices aimed at producing cost-effective results. The results will also support WE&T objectives.

4-3.7 PNW RTU Savings Research Project. A key impact of the research on the potential for savings in utility RTU service programs from standard service measures has been Honeywell's development of a new dry-bulb sensor (C7660) for use in a widely used Honeywell economizer controller (W7459). The existing dry-bulb sensor (C7650) in this controller was discovered by PNW utility-supported researchers to have a 6-10°F deadband, effectively limiting economizer cooling potential when milder overnight conditions exist, and depending on how the installing contractor set the controller logic. Honeywell is now offering its HVAC OEM customers a new sensor that provides appropriate deadband limits (defined as no more than 2°F in the ARTU feature set) as well as easier and more accurate installer set up, and is field-replaceable, having the identical form factor as the old sensor. The IOUs will immediately assess the cost-benefit of the new sensor for potential inclusion in California utility-funded existing RTU service programs, both IOU and POU. State agencies will be briefed on the issue as well, with collaborative development of a sensor replacement program in state-owned and leased buildings. In addition, IOUs and POUs must ensure that the old sensor is not used in any new RTUs coming into the state and/or being supported through IOU energy efficiency programs. This is a small likelihood with new equipment. For existing units, replacing this sensor could be a part of an expanded RTU service package. As appropriate, the issue with the older sensor will immediately become a part of the course content for the HVAC WE&T Program related to economizers. New Buildings Institute (NBI), the research project manager, will provide additional findings from the project to the IOUs for assessment in relation to immediate program design considerations.

Sub-program Benefits: The old sensor is limiting economizer cooling savings during milder cooling season overnight climate conditions across California. The new sensor will provide a improvement in performance in existing RTUs.

4-3.8 Hot/Dry Air Conditioning Pilot. The IOUs propose to develop a pilot program approach for introduction of the Hot Dry Air Conditioner technology to the market place. It is envisioned that the pilot will offer a tiered incentive program. This delivery mechanism will be employed to ensure that only qualifying equipment is

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installed, that it is installed properly, and that the necessary market acceptance information is obtained to expand the program effectively in the future.

The pilot will test a three-tier structure based on the CEC HDAC performance specification at 115 degrees F, modified as necessary to ensure that an adequate number of commercially available OEM equipment qualifies for the first-tier rebate. The second-tier rebate will be set at a minimum EER of 8 (the CEC HDAC performance specification) and will encourage the installation of OEM equipment with improved controls or equipment with advanced air-cooled heat exchangers. The third-tier rebate will be set at a minimum level appropriate for evaporatively cooled refrigerant-based air conditioning technologies. The HDAC pilot will include both residential and small commercial technologies.

It is anticipated that a web-based list of qualifying products will be developed for the pilot and shared Statewide and regionally throughout the western states.

Task 4-3.9 Natural Gas Savings. A significant effort is required to sufficiently address improving energy efficiency in residential and commercial natural gas heating systems. This effort will be implemented in conjunction with the Consortium for Energy Efficiency (CEE) Gas Committee work plan. CEE member utilities work collaboratively on such topics of interest. This provides important leverage for accomplishing program goals. CEE members are proposing to eliminate AFUE 90% furnaces as the CEE Tier 1 efficiency level and move to only promote 92% and 94% AFUE products. CEE members will be looking into gas heating QI issues and coordinating with ENERGY STAR® program specifications. Also, CEE will be adding an additional tier and a controls component to its boiler specification. The IOUs will actively work with CEE staff and other members to address and support these initiatives and incorporate results into its programs as part of the overall continuous program improvement process. The IOUs will make sure that the QM component is addressed along with the QI component through WE&T and related program channels.

The IOU HVAC Program Management Team will also influence appropriate Emerging Technology projects, WE&T activities and pilot programs to address heating equipment sizing, fan power, equipment maintenance, equipment efficiency, early replacement and carbon impacts. With a scope that includes detailed examination of carbon impacts, ET plans assessments and potential follow-on demonstration projects of OEM Dual-fuel Package Units, gas absorption heat pumps, and de-superheater integration with combined hydronic systems. Dual-fuel systems, both package and split, will also be assessed with respect to DR potential. In addition, as described in Task 4.6.3, below, the IOUs, working with LBNL and other interested parties, will actively support development of test procedures that could either be stand-alone or become part of the ASHRAE 103 [Method of Testing for Annual Fuel Utilization Efficiency of Residential Central Furnaces and Boilers] and ASHRAE 210/240 thermal performance testing standards. The procedures cover

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pressure difference, accounting for power factor, accounting for ancillary power consumption (e.g., combustion air blowers) and differences between furnace controls.

Finally, as described in Task 4.6.3, below, the IOUs will support as needed the work that LBNL and the CEC are doing on a National Standard Method of Testing Furnaces/Air Handlers for Air Leakage. LBNL has funding from the CEC and through ASHRAE (SPC 193) to develop a national standard test method. There is little use in sealing ducts properly if the system still leaks 100 cfm from the mechanical components. Data indicates that furnaces leak about 50 cfm with a wide range of variation. This national standard should be complete and available in 2009. When the standard is available, the IOUs will assess its related efficiency benefits for use in program design.

Strategy 4-4 – Adopt a progressive set of building codes that support the deployment of peak efficient equipment.

The Advocacy sub-program will support development of building codes aimed at deployment of peak efficient equipment aimed at equipment improvements including the ARTU, climate-optimized cooling, the Western Cooling Challenge, and through national advocacy work with AHRI, ASHRAE, efficiency advocates including the American Council for An Energy Efficient Economy and the Natural Resources Defense Council, and other HVAC industry stakeholders.

Peak efficiency also includes a component for DR/DSM for smaller commercial buildings. The Advocacy sub-program will produce a detailed impact and market assessment on the DR/DSM approaches currently in use by the IOUs to determine if the current approaches are meeting demand management needs and/or require expansion, updating or revision. Continuous DR tool effectiveness assessments will be an ongoing responsibility of the sub-program. In addition, the IOUs will carry out the recommendations for further DR tool development for small commercial buildings being carried out through ongoing work by the Demand Response Research Center (DRRC) at LBNL. The work includes, but is not limited to:

- Exploring methods to deploy Open Automated Demand Response, a set of standard, continuous, open communication signals and systems provided over the Internet to allow facilities to automate their demand response. This project is aimed at smaller commercial buildings that do not have centralized or sophisticated control systems and concentrates and compares various communication means to deliver automated DR signals to these buildings.
- Further testing of the use of a customized Programmable Communicating Thermostat (PCT) based on a residential DR PCT design for achieving DR in small commercial buildings.
- Further testing of financial and related rate design DR approaches in appropriate markets.

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Specific recommendations for further DR tool development are forthcoming in DRRC reports. These new approaches need further technical development and market conditioning. The sub-program will support the recommendations for continuing the work through the HVAC Industry Leadership Task Force and with continued support from the CEC, which provides financial resources to DRRC for ongoing DR work. SMUD has also provided support for the recent DR market testing and may continue to do so. The sub-program will follow up on a project on FDD for residential applications that was completed for SMUD to determine its feasibility for use.

In addition, the sub-program will recommend approaches on DR/IDSM with AMI infrastructure improvements that are planned and underway. Overall, the sub-program will add emphasis and focus on understanding, integrating and accelerating DR/IDSM approaches through existing and new DR and energy efficiency programs.

Sub-program Benefits: Code requirements for peak efficiency will lead to high market penetration of higher efficiency equipment. DR/DSM options will have greater market and utility system impact to achieve Statewide demand management objectives.

Strategy 4-5 – Adopt nationwide standards/guidelines for onboard diagnostics functionality and specifications for designated sensor mount locations.

4-5.1 PIER FDD. NBI and the WCEC have been awarded a PIER Buildings Program contract for a range of activities in small commercial FDD. The work that PIER has approved is directly responsive to several goals in the HVAC sector strategy of the Strategic Plan. SCG and SCE committed financial and/or technical resources to the project. The proposed project outputs are directly related to program design specifications/requirements for commercial HVAC programs. The results of the PIER project will be monitored and then, based on the results, a plan will be developed to further commercialize the FDD technology.

Sub-program Benefits: The overall PIER FDD program is directly responsive to the HVAC sector goal in both the CPUC and CEC's strategic plans. The PIER funding provides significant off-IOU budget support to sector efforts.

4-5.2 National Diagnostic Protocol Evaluator. As described in the HVAC Quality Maintenance sub-program, a level of uncertainty exists around the energy benefits of equipment service-based measures, such as refrigerant charge and airflow (RCA), currently offered in IOU energy efficiency programs. PIER is supporting Dr. Jim Braun, Purdue University, in the development of a national benchmark evaluation protocol for refrigeration charge checking and evaporator/condenser airflow diagnostics. When the evaluator tool is available, the IOUs will require all of the refrigeration charge checking tools used by vendors in any IOU HVAC QM programs to be evaluated with the tool. It is expected that most, if not all, current vendors will

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submit their tools as part of the protocol development and calibration process. (*Also supports near-term strategy 4-6*).

Sub-program Benefits: By providing a nationally recognized protocol, the IOUs will have a tool to evaluate the claims of refrigeration diagnostics vendors. The results will be important to IOU HVAC program design in the near and mid-term.

4-5.3 RTU FDD Technology and Market Assessment. The PIER FDD project contractors will review all known data on the type, use, and cost/benefit of current onboard FDD capabilities, including remote communications functionality in commercially available package RTUs. Market user information will be collected in order to establish the conditions favorable for FDD use, to inform industry vendors on market interest and value, and to provide market transformation indicators for use in IOU FDD program elements.

Sub-program Benefits: This work will result in technology reviews that could be further substantiated as needed through the ET framework. This work will also inform WE&T content and market conditioning, and form the basis for proposing minimum FDD RTU standards for IOU programs and/or Title 24.

4-5.4 Prioritize In-Field Diagnostic and Maintenance approaches. This work will initially focus on existing data and field experience. Some laboratory testing may be involved. (*Also supports near-term strategy 4-6*).

Sub-program Benefits: Results will inform the QM sub-program and other industry stakeholders about approaches to more effective program and financial incentive design, and contribute to advancing HVAC WE&T content.

4-5.5 FDD Working Group. A key stakeholder group is required to address the establishment of minimum FDD standards in California, and perhaps nationally, in package HVAC. Establishing this stakeholder group will be a priority objective for the sub-program. It is anticipated that the FDD working group will become a sub-group as part of the overall HVAC Industry Leadership Task Force framework discussed in the core Residential and Commercial HVAC Program. (*Activity meets overall Near- and Mid-Term Goals*).

Sub-program Benefits: Establishing an active FDD stakeholder working group under the umbrella of the HVAC Industry Leadership Task Force is an effective approach to market understanding and potential market transformation, and to validate a potential submission to Title 24 for FDD as a prescriptive measure.

4-5.6 RTU FDD Prescriptive Measure – Title 24. The sub-program will develop and submit for public comment, in part depending on direction provided by the FDD stakeholder group and CEC staff, a template for FDD with remote communications functionality for package RTUs as a Prescriptive Measure in the next Title 24 Non-Residential Standards revision. (*Also supports strategy 4-4*).

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Sub-program Benefits: Establishment of minimum FDD standards and/or guidelines will provide a new tool to support quality maintenance practices in the field. Submission to Title 24 of an FDD prescriptive measure will provide the strongest market signal as to the importance of effective equipment performance maintenance.

PIER FDD Project Schedule: The overall FDD project begins approximately mid-2nd quarter of 2009 and continues into the 2nd quarter of 2012. Given the cross-cutting nature of the project, including technology review, market research with building owners/managers and HVAC product vendors, engineering analysis, and the need for a stakeholders group, the project will need close coordination and communication with IOU ET staff, program staff, and codes and standards staff. This coordination will be realized through the inter-utility program management team (consisting of the appropriate program managers from the ET, Codes and Standards, and HVAC programs at each of the four IOUs) that will meet on a quarterly basis, as well as directly through the PIER contractors NBI and WCEC.

4-5.7 Sensor Mount Locations. The sub-program will immediately review the work done by Reid Hart, formerly of the Eugene (OR) Water and Electric Board, on outside sensor placement issues. Other work may be available for review as well. Honeywell is evaluating new outdoor sensor enclosures based on Reid's work. In addition, the sub-program needs to review the features of the Western Premium Economizer program, along with the economizer service approach found in the AirCare Plus program by Peci for providing an optimized economizer service package. This economizer assessment is directly linked to activities described in the Peci-proposed retrofit control package, the Premium Ventilation project, the ARTU, and the Western Cooling Challenge. With this information in hand, together with other experience and data from California or elsewhere, the appropriate program response will be made to establish and promote more effective sensor mounting in the field and at the HVAC OEM level, as needed.

Sub-program Benefits: Sensor placement is critical for achieving and maintaining RTU energy savings through effective control system performance.

4-5.8 HVAC Roundtable Recommendations. In October 2006, a national HVAC Roundtable supported by PIER was held in California. It included HVAC-related professionals from private industry, utility programs, researchers, and efficiency advocates. The list of recommendations from the Roundtable directly informed the basis for several of the goals and recommended actions identified by the Strategic Plan and the CEC's report to the Legislature. Several recommended actions are directed at the HVAC industry and national organizations such as the Air Conditioning, Heating and Refrigeration Institute (AHRI), American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE), and the U.S. DOE. The Advocacy sub-program, in conjunction with the WCEC, will determine the most appropriate approaches to these national stakeholders on these issues. The IOUs will offer co-funding for resolving certain technical issues. Other utilities and

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regional market transformation organizations, such as the Northeast Energy Partnerships and the Northwest Energy Efficiency Alliance, will be brought into this national process to demonstrate additional breadth and depth of interest to the national stakeholders. A positive response from the HVAC industry and DOE can best be leveraged by a clear and sustained message from the IOUs, local HVAC stakeholders, and utility/energy efficiency industry allies. Discussions are underway about convening a California-focused HVAC roundtable before finalizing the PIPs in the July-August 2009 timeframe.

Of the Roundtable recommendations numbered 1-5 and 8-9,²³ formal and informal communications are assumed to be required to succeed on a national scale with the HVAC OEMs, AHRI, and related private and public organizations, including, but not limited to: U.S. DOE, state energy agencies, efficiency advocates, utility regulators (potentially through the National Association of Regulatory Utility Commissioners, or NARUC), along with national and regional energy efficiency organizations. The IOUs, in conjunction with the WCEC, will consider options for an advocacy agenda to discuss, prioritize, and address the following items with HVAC industry stakeholder involvement:

1. Low Ambient Charge Checking Protocol. There is an immediate need for the HVAC industry to update and expand the range of in-field unit refrigeration charge diagnostic protocols down to 50°F outside temperature, 40°F degree wet-bulb (basically a dry coil), with an upper limit of 115°F outside. The Carrier representative noted that for a fixed metering device, the lower limit has probably already been reached.²⁴ Most current equipment with thermostatic expansion valves (TxVs) could probably not go much lower (60°F); however, with better (wider range/extended range) TxV valves, a lower range might be possible. *This work has been initially addressed through a PIER BERG research grant, but additional work needs to be completed to finalize the low ambient approach initially indicated to be possible at 50°F dry-bulb.*

Sub-program Benefits: HVAC technicians are most available to provide maintenance services outside of the cooling season, during which they have little time except to respond to customer emergencies. The ability to conduct charge checking as needed during more months of the year with a more accurate set of tools is critical to offering effective HVAC-service related programs.

2. Technical Review of Refrigerant Charge Diagnostic Tables/Charts. There is an immediate need for manufacturers to review and revise, as needed, the current refrigerant cycle tables along with evaporator and condenser performance charts: partly in relation to the low ambient item noted above, and also for other reasons, including differences in operating pressures in newer, higher-efficiency vs. older, lower-efficiency units. The Carrier representative noted that not taking into

²³ HVAC Roundtable Summary and Notes pp 4-5.

²⁴ HVAC Roundtable Summary and Notes pp 4-5.

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account the different operating pressures of new higher efficiency units could result in overcharging.²⁵

Sub-program Benefits: More accurate diagnostic tools, in this case the foundational metrics for charge diagnostics, leads to more effective performance in maintenance of the equipment.

3. Industry Standard Unit Data for Field Service. There is a critical need for manufacturers to provide data labeling via stickers, plates, or (potentially) an RFID tag, with enhanced data sets such as superheat/subcooling charts for a wide range of conditions (such as indoor & outdoor dry bulb/wet bulb temperatures), permanently affixed to each unit. Depending on the approach chosen, a standard graphic layout and mounting location should be established industry-wide.

Sub-program Benefits: An industry standard approach will help service technicians perform field diagnosis and correction as needed.

4. Minimum FDD Standards. The industry should develop a minimum standard for onboard diagnostics functionality for all units. This should take the form of a universal plug point for all manufacturers with a universal protocol for data requirements, data analysis and data display. *The new PIER FDD project will expand these standards to include embedded remote communications capability, so as to enable remote diagnostics by service technicians, owner/managers, and utility program operators for QI/QM, M&V, and persistence of savings evaluation requirements.*

Sub-program Benefits: An industry standard will help service technicians with diagnosis and repair of operating faults.

5. Industry Standards Sensor Mount Locations. Manufacturers should create a standard or specification for designated sensor mount locations for conducting field diagnostics. Manufacturers should mark appropriate locations for technicians to attach sensors. At least one manufacturer has a product with sensor mounting locations marked. One manufacturer provides a sensor port that is accessible without requiring the service technician to open the unit for certain service work.

Sub-program Benefits: An industry standard will help service technicians with diagnosis and repair of operating faults.

6. Prioritize In-Field Service Approaches. There is a need to prioritize in-field diagnostic approaches based on cost-benefit of the energy savings, cost to diagnose and repair, and the frequency of occurrence of faults. This can be determined by review and analysis of existing field experience. *This*

²⁵ Ibid.

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recommendation is being addressed through the PIER FDD project (mentioned under Paragraph 4., above).

Sub-program Benefits: Prioritization of service benefits will enable more effective IOU diagnostic and system maintenance program design.

7. Definition of Coil Cleaning. There is a critical need to define a clean coil and how to measure it, including quantification of ROI for coil cleaning, equipment life, energy performance, and reliability.

Sub-program Benefits: Clarification of the benefits will enable more effective IOU diagnostic program design.

8. HVAC Information Clearinghouse. There is a critical need to gather protocols and incoming R&D/field data, and post them to a publicly accessible place. Collecting such information will allow researchers, practitioners and IOU HVAC program designers to examine the quality of the data, including sensor and instrument types, accuracies, measurement uncertainties, and testing methods, as well as equipment operating experience. AHRI will be consulted about the need for such an information-hosting service and determine what options are available nationally. There is a potential role for WCEC in this service. If it is determined that WCEC is an appropriate institution to develop and host this service, IOU funding will be used to initiate and support the activity from 2009-2015. Outside funding will be sought immediately to supplement and/or displace IOU funds over time. The service will need dedicated staff resources to continuously update and assess the information being gathered.

Sub-program Benefits: This type of information sharing will benefit utility program administrators, WE&T stakeholders, and a wide range of industry participants by providing access to timely, useful information on a wide range of HVAC issues. This increased information and awareness will enhance understanding of market transformation needs and lead to continuous improvement of IOU HVAC-related programs.

9. National Testing Protocols. There is a need to revise DOE/ASHRAE/AHRI test pressures for furnaces and air handlers, and require measured blower power. Fan power should be included as a required measurement to help determine the impact of airflow on overall energy savings. Fan power, especially with electronically commutated motors, has a bigger percentage impact on total system efficiency moving forward, especially in commercial systems with integrated ventilation or economizers. A revised testing approach will be developed and proposed to the national stakeholders and other utility and efficiency-related organizations will be recruited in support of this effort.

Sub-program Benefits: A test protocol will allow analysis and establishment of fan power efficiency standards that could improve system energy efficiency.

10. California IOU RCA Program Revision. For California utility-sponsored RCA programs, there is a need to modify the existing protocols that currently pass poorly performing units. This issue will be assessed in the RCA program revision process that is being proposed through the QM sub-program and will be considered in the continuous improvement process for upgrading HVAC programs.

Sub-program Benefits: Quality standards will be increased and areas for additional training will be identified.

11. R&D on HVAC Technician-Friendly Airflow Measurement Techniques. An investigation of alternative airflow measurement techniques, including virtual sensors, will be pursued.

Sub-program Benefits: Airflow measurements will occur more often and measurement accuracy will be increased.

12. TxV Installation Quality. Field experience indicates that TxV sensing bulb insulation, orientation, contact, and location must be corrected before diagnosing and/or correcting RCA. This issue will be assessed in the QM sub-program that is being proposed. In addition, new expansion valve technologies²⁶ that assert better control of refrigerant flow, thus providing more reliable energy savings and increased compressor life, will be evaluated to determine their potential use in updated program offerings.

Sub-program Benefits: This will improve the accuracy in diagnosing the need for charge and airflow correction.

13. Existing Unit Sizing Check. HVAC system sizing is a major efficiency issue, and the integration of proper sizing within the utility field diagnostic/service protocol will be evaluated. The potential market responses to proper equipment sizing must be understood to effectively integrate into QI programs (i.e., downsizing equipment could result in a negative market reaction if contractors and consumers believe that they will have inadequate cooling capacity for the conditioned space).

Sub-program Benefits: This field program element would provide valuable information on the nature of the sizing problem. The information would support program design features found to be cost-effective.

4-5.9 Fault Detection and Diagnostics (FDD) Roundtable. In June 2007, with PIER support, an FDD Roundtable was held in California that included FDD-related professionals from private industry, utility programs, researchers, the CEC, state

²⁶ For example, Microstaq recently announced the release of a new silicon expansion valve that precisely meters refrigerant into the evaporator and is a replacement for mechanical TxVs.

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agencies, and efficiency advocates. The group addressed a list of technical and market challenges that have slowed market uptake of FDD for small and larger commercial HVAC systems. The group created a "roadmap" consisting of several action items to be led by various organizations and collaborative efforts. Sempra Utilities has requested and received a proposal from WCEC to initiate the first FDD Roundtable action item step to characterize a few major FDD tools as to their benefit-cost and usability in larger commercial buildings. Some of the work done through this project will impact the small commercial market, as well as being directly relevant to the Strategic Plan Commercial Sector strategy. The recommendations from the FDD Roundtable will be reviewed as part of the development of an overall HVAC roadmap and action plan.

Sub-program Benefits: Implementation of the Roundtable recommendations would accelerate market transformation opportunities for increased market use of FDD capabilities that in turn would increase quality performance maintenance practices in IOU programs for both HVAC and whole building design.

Strategy 4-6 – Prioritize in-field diagnostic and maintenance approaches based on the anticipated size of the savings, cost of repairs, and the frequency of faults occurring.

4-6.1 PIER FDD. The PIER FDD project element discussed in Paragraph 4-5.1, above, directly addresses this strategic element.

Sub-program Benefits: addressed previously.

4-6.2 Low Ambient Charge Checking. Through a PIER Build Energy Research Grant (BERG) research project, Keith Temple from Field Diagnostics Services, Inc. (FDSI) proposed and completed initial research on the potential for conducting in-field refrigeration cycle diagnostics at lower ambient temperatures than currently specified. Experimental data and simulation results were used to characterize performance at low outdoor ambient air temperature and low indoor (return) air wet-bulb temperature conditions. Proposed enhancements to the existing protocols, focusing on refrigerant charge and indoor airflow verification, were developed including (1) superheat verification for TxV systems, (2) the use of both superheat and subcooling to evaluate refrigerant charge for non-TxV systems, addressing cases when superheat alone is not adequate, (3) new performance expectations for superheat (expanded) and subcooling (new) for non-TxV systems, and (4) expanded performance expectations for the temperature split airflow evaluation method. Based on the available data, the expanded protocols were successful at identifying refrigerant charge (low and high) and indoor airflow faults (low and high). The following recommendations will be considered as part of the QM sub-program that is being proposed. Expanding the analytical approach to include laboratory and field-testing as appropriate will also be considered. The completed work and conclusions are based solely on simulation analysis.

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- a. A parallel implementation of the enhanced protocol will address both the unitary HVAC system verification requirements of Title 24 and the protocols adopted by the HVAC QM Program. The first phase of implementation could focus on addressing deficiencies in the current protocols through the following activities:
 - A revised target superheat table is recommended to address the indoor dry-bulb temperature dependence at low indoor air wet-bulb temperatures.
 - A revised target temperature split table is recommended to address the outdoor temperature dependence and the offset between the existing table and the current (experimental and simulation) data.
 - Field measurement locations will be clarified to clearly identify their positions relative to the indoor fan.
 - The refrigerant charge evaluation procedure for TxV systems could be improved by requiring superheat verification.
- b. The second phase of implementation will address the specific protocol enhancements associated with low-ambient testing, after additional research (e.g., further validation testing) has been completed. This would include:
 - An expanded protocol for non-TxV charge evaluation that includes both superheat and subcooling evaluation, including appropriate performance expectations.
 - An expanded target temperature split table to address the low-ambient test conditions. This two-phase approach would provide short-term benefits with relatively low technical risk.

Sub-program Benefits: Completion of the low ambient protocol would allow HVAC service technicians to conduct refrigeration diagnostics in the field outside the cooling season, when they are too busy responding to emergency calls to conduct more thorough service diagnostics.

4.6.3 Lawrence Berkeley National Laboratory (LBNL) HVAC Activities. LBNL researchers are working on a number of HVAC efficiency-related topics relevant to the Strategic Plan and the entire suite of proposed HVAC sub-programs including:

- a. National Standard Method of Testing Furnaces/Air Handlers for Air Leakage. LBNL has funding from the CEC and through ASHRAE (SPC 193) to develop a national standard test method. There is little use in sealing ducts properly if the system still leaks 100 cfm from the mechanical components. Data indicates that furnaces leak about 50 cfm with a wide range of variation. This national standard should be complete and available in 2009. LBNL is investigating different measurement techniques. Currently, simple pressurization may be a viable option – with some possible complications with regard to positive and negative pressure testing and isolating positive and negative pressure sections of equipment. Manufacturers support this standard development because they want a single national standard to test to, rather than a patchwork of state-by-state legislation, requirements, tests, and methods. Currently, Florida has requirements for low

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leakage rates and California needs a similar standard. This issue will be addressed as it is resolved. *(Also supports near-term strategies 4-3 and 4-4).*

Sub-program Benefits: This project is not a direct responsibility of the HVAC Industry Leadership Task Force, but is necessary to set formal limits on cabinet air leakage, thereby increasing system operating efficiency.

- b. ASHRAE Standards Improvement. Working with CEC support to develop test procedures that could either be stand-alone or become part of the ASHRAE 103 [Method of Testing for Annual Fuel Utilization Efficiency of Residential Central Furnaces and Boilers] and ASHRAE 210/240 thermal performance testing standards. The procedures cover pressure difference, accounting for power factor, accounting for ancillary power consumption (e.g., combustion air blowers) and differences between furnace controls. These issues will be addressed as they are resolved. *(Also supports near-term strategies 4-3 and 4-4).*

Sub-program Benefits: This project is not a direct responsibility of the Advocacy sub-program, but is necessary to increase system operating efficiency.

- c. In-Building Vent Air Grille Selection/Placement. LBNL staff and others note that the issue of vent air grille selection and placement is a significant component of providing adequate indoor comfort. Getting the right throw and reducing airflow resistance and noise are not typically done, but can be done, since they appear relatively simple to do. Chitwood Energy Management and Integrated Building and Construction Solutions are expert advocates in this area. Recommendations from these and other parties will be solicited and next steps on further product development will be initiated, if needed. Additionally, technical information will be disseminated to the market through the WE&T channel and through energy efficiency program design. *(Also supports near-term strategy 4-3).*

Sub-program Benefits: The benefits of vent grille selection and placement include customer comfort and increased system operating efficiency from reduced airflow resistance, and, therefore, reduced energy use.

- d. System Design. LBNL staff and others note that there is an immediate need for more effective design guidance for residential HVAC systems. Without an actual design, there is no baseline condition to compare to for diagnostics/testing (and for code and utility program compliance) to ensure that systems are correctly installed. The IOUs will address this issue through the ENERGY STAR® Residential Quality Installation and HVAC WE&T Programs.

Sub-program Benefits: Properly designed HVAC systems are fundamental to managing energy use and peak demand in these systems.

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- e. RTU Diagnostics. Proprietary work is ongoing with Target Corporation to develop a set of diagnostic algorithms. The results of these algorithms will be evaluated and integrated into HVAC programs as they become publicly available.

Sub-program Benefits: Public access to diagnostic tools provides an opportunity for market uptake of advanced diagnostic capabilities to improve HVAC system maintenance.

4.6.4 National Center for Energy Management and Buildings Technologies (NCEMBT) Activity:

- a. Premium Rooftop Equipment (RTU) Operations and Maintenance (O&M) Initiative. The initiative seeks to reduce the energy required and energy wasted in about one-half of the existing commercial and institutional buildings in California by 20%. The initiative is aimed specifically at commercial building floor space that is conditioned by unitary packaged rooftop equipment (RTU). The proposed program supports the CPUC “Big Bold Energy Efficiency Strategies,” with focus on one requirement: “The HVAC industry will be reshaped to ensure optimal equipment performance.”

To achieve the stated energy reduction goal, the current status of the existing packaged HVAC equipment and its operation needs to be well understood so that energy-efficient and cost-effective intervention measures can be designed and implemented. New tools and evaluation methods will be developed on which the HVAC practitioners will be trained, thus enhancing their skills. In conjunction with the San Diego California Joint Apprenticeship Training Center and the California Polytechnic State University, San Luis Obispo, the team will develop methodologies to determine current thermal and ventilation loads and rebalance HVAC systems in light of commercial applications, develop and field test a protocol to rebalance HVAC systems to current loads, and confirm in the laboratory the scientific and technical basis for the O&M concept. Then, HVAC practitioners will apply the proposed intervention in the field, while the research findings will form the basis for recommendations for economic and public policy.

The proposed RTU O&M initiative goes beyond simple recommissioning of existing systems (i.e., bringing systems to design intent). It takes into consideration the fact that most installed RTUs are oversized due to current design and installation practices. For example, an 8-ton cooling load is most likely met with a 10-ton RTU, in which case the system will be over-designed and will under-perform, resulting in operational waste. This system could be rebalanced, for example, by adjusting the system flows, both air and refrigerant, to more closely match its capacity to the actual building cooling load and thus increase its operational efficiency. However, before the RTU can be rebalanced, the actual load needs to be accurately determined in cost-effective and efficient manner. Thus, the project will develop procedures to do so, derived from existing building recommissioning methods.

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The results of the laboratory and field test will provide the basis for development of a core curriculum for teaching the O&M concept to HVAC practitioners and engineers, as well as incorporating it into higher education teachings.

Sub-program Benefits: (a) Reducing the energy required and energy wasted in light commercial application by 20% represents a potential annual savings of 1,708 GWh, a reduction of 1,550 MW of peak demand, and a reduction of 534,608 metric tons of greenhouse gases. (b) Reaching out to 16,000 technicians employed by 625 contractors in California via training and education derived from the results of this program has a potential of adding 7,000,000 new labor hours at full impact. (c) At a full level of implementation, the program could potentially add 1,400,000 labor-hours annually for optimization of RTU equipment.

- b. Best Light Commercial HVAC Duct Leakage Practices. Air duct leakage in residential buildings has been receiving a lot of attention toward trying to mitigate its unwanted effects, which can increase energy usage. California Energy Code Title 24 requires duct leakage to be less than 6% of the supply airflow in typical new homes. A similar approach for light commercial systems does not exist at this time. A number of field studies investigated duct leakage in light commercial buildings. The overall consensus was that duct leakage in these buildings is higher than in residential ones. Modera et. al. estimated that eliminating duct leakage could save as much as 1 kWh/ft² of building floor area per year.

A new method, Zone DeltaP, has been developed by the University of Nevada Las Vegas under funding from the National Center for Energy Management and Building Technologies (NCEMBT). The Zone DeltaP method, derived from the duct pressurization technique, allows workers to quantify and locate leaks within an air distribution system. Zone bags are used to create artificial restrictions inside the duct and, consequently, different levels of leak pressures and flows. When the zone bag is inflated inside the duct, two different levels of pressures and leak flows (upstream and downstream of the zone bag) are artificially created. A very simple calculation is then performed to estimate the leakage in these two locations. The method was developed for residential air distribution systems, but it is applicable to light commercial systems as well.

Under a recent PIER-funded project, a new training facility, "The House That Teaches," has been established at the Bay Area Trust Fund Joint Apprenticeship Training Center (JATC) in San Jose. This project builds upon the approaches and methods developed under these programs to teach duct leakage measurement practices to HVAC installers and technicians. The team will conduct laboratory testing on rectangular ducts to determine what, or even if, modifications need to be done to the Zone DeltaP method to conduct the proposed work. This will be done by our research partners at the California Polytechnic State University, San Luis Obispo. Assuming successful laboratory demonstration of the method, a

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limited number of HVAC practitioners will be trained in the application of the ZoneDeltaP method.

This pilot training program will involve classroom lecture and hands-on experience. With the assistance of the HVAC practitioners, the team will conduct a field test using the ZoneDeltaP test in 30 to 40 light commercial systems. This should provide a reasonable statistical sample of what the method can do and how efficiently it can be performed cost-wise. The ultimate aims of the field test are to apply intervention techniques for “leaky duct systems,” demonstrate its effectiveness, and verify the energy savings potential of properly sealed light commercial air distribution systems. The savings potential will be derived from performing energy consumption monitoring before and after the intervention.

Sub-program Benefits: Assuming 47 percent of commercial floor space in California is cooled by light commercial systems, and using the previous developed estimate of 1kWh/ft²/yr savings, the program at full implementation may save as much as 345 GWh annually, with corresponding reductions in peak demand and GHG emissions.

- c. Best Residential HVAC Duct Leakage Practices - There is a need to connect these results to the marketplace via developing best practices for training HVAC contractors and technicians and education of building owners and operators. As mentioned under Paragraph b., above, the new "The House That Teaches" training facility has been established at the JATC in San Jose. This is one of sixteen JATCs in California that serve 13,000 sheet metal workers and HVAC technicians (out of the 150,000 total SMWIA members), as well as 170 mechanical contractors Statewide (out of 4500 SMACNA members nationally). "The House That Teaches" gives this training center unique capabilities to research and develop residential best practices for expanded hands-on training in new HVAC products, installation techniques, and Title 24 requirements.

This sub-program builds upon the approaches and methods developed under these programs and will use "The House That Teaches" to teach duct leakage measurement practices to HVAC installers and technicians. The team will train a limited number of HVAC practitioners in the application of the ZoneDeltaP method. This pilot training program will involve classroom lecture and hands-on experience. The important lesson to be discovered from this program is for the students to find out how to use the ZoneDeltaP method and to judiciously select a starting point for the zone bag application in a specific duct system. As mentioned earlier, this method will determine not only localized leaks, but also the total global leakage and the locations of large leaks.

With the assistance of the HVAC practitioners, the team will conduct a field test in California using the ZoneDeltaP test in 30 to 40 homes. This should give a reasonable statistical sample of what the method can do and how efficiently it can be performed cost-wise. The ultimate aim of the field test is to apply intervention techniques for leaky duct systems, i.e., sealing the larger leaks of these ducts to

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try to achieve a leak rate of 6% or lower as compared to the supply air flow in the system.

Sub-program Benefits: Assuming a 15 percent cooling energy reduction for households with central air conditioning older than four years, the potential savings may be up to 475 GWh, with corresponding reductions in peak demand and GHG emissions.

6. Program Implementation

a) Statewide IOU coordination

The IOUs propose managing this sub-program under the auspices of the WCEC, which is in a unique position to spearhead the many HVAC technical and policy issues proposed herein. The WCEC will be responsible for managing day-to-day project activities, budget, and staffing, and will ultimately be accountable to the IOUs for providing final deliverables for the various projects assigned.

The IOUs will provide annual funding to the WCEC during the 2009-2011 program cycle to support the work plan. Prioritization of project activities will be established through the HVAC Industry Leadership Task Force described in the core Residential and Commercial HVAC Program PIP, above. WCEC management will have the authority to direct and redirect sub-program activities and related funding, as necessary, with the advice of the IOUs and the HVAC Industry Leadership Task Force.

i. Program name: HVAC Technologies and System Diagnostics Advocacy.

ii. Program delivery mechanisms

The WCEC will act as a regional center for HVAC technical and policy issues and will be jointly funded by the IOUs as a non-resource program.

iii. Incentive levels

N/A.

iv. Marketing and outreach plans

N/A.

v. IOU program interactions

The WCEC is in position, as an independent organization, to interact with other agencies on a state and regional effort to dramatically affect the energy and peak demand performance of HVAC systems and appropriately address climate-optimized solutions.

vi. Similar IOU and POU programs

Through this sub-program activity, the IOUs will engage the POUs in an effort to speak with one common voice in California on HVAC issues.

b) Program delivery and coordination

i. Emerging Technologies program

The Emerging Technologies Program (ETP) provides a portion of the WCEC's operating budget to work on technical demonstrations and lab tests. This sub-program will go beyond the current support offered by the ETP to provide the necessary funding to WCEC to implement a dedicated effort that addresses other technical and policy issues currently unaddressed by the typical ETP project. All activities pursued under this sub-program will require coordination with ETP and PIER projects to eliminate the possibility of a duplication of efforts and to accelerate use of results. Additional coordination activities will be realized through the Joint Program Management Team as described in the core Residential and Commercial HVAC Program.

ii. Codes and Standards program

As technologies and processes addressed through this Program become adopted by the industry and IOU programs, the minimum threshold for eligibility in California can increase to lock in the higher efficiency levels and continue an upward level of efficiency and performance-enhancing features for HVAC equipment. Additional coordination activities will be realized through the Joint Program Management Team as described in the core Residential and Commercial HVAC Program.

iii. WE&T efforts

The issues addressed through this Technology and System Diagnostics Advocacy sub-program effort will help to provide current and relevant information to the HVAC WE&T Program and will help that program continually evolve, to ensure that the existing and future HVAC workforce is educated on the most up-to-date technologies and QI/QM practices.

iv. Program-specific marketing and outreach efforts

N/A.

v. Non-energy activities of program

The sub-program represents a concentrated effort on existing HVAC technology and resource issues. As the near-term energy savings from this effort is difficult to quantify, it is being proposed exclusively as a non-resource effort.

vi. Non-IOU programs

The sub-program will leverage its involvement through the WCEC to pursue regional strategies that involve the California POU's and other utilities and utility-related organizations in Arizona, Nevada, New Mexico, and the Pacific Northwest.

vii. CEC work on PIER

See Section 6.b.i., above.

viii. CEC work on Codes and Standards

See Section 6.b.ii., above.

ix. Non-utility market initiatives

Various national HVAC-related efforts are currently ongoing (e.g., U.S. DOE climate-optimized rulemaking). The Technology and System Diagnostics Advocacy Program seeks to participate in all of these initiatives. Centralizing this interaction through the WCEC allows for a concentrated, coordinated effort on the issues most pertinent to California.

c) Best Practices

A snapshot of advanced or best-in-class HVAC-related technology currently available will be undertaken immediately. It is likely that much of this information is in hand, but not necessarily easily accessible. U.S. DOE will be asked to share its future HVAC technology assessment, when completed in 2008. This request will be made as one of the first actions under this sub-program.

d) Innovation

This Program represents a break from the “business as usual” approach and seeks to fund the WCEC, an industry-leading non-profit entity, at unprecedented levels to tackle and resolve fundamental technical and policy issues that have prevented significant energy and demand savings from being realized from the installation and maintenance of HVAC systems. This approach will provide the focus required to accomplish the state’s Big Bold Energy Efficiency HVAC goals.

e) Integrated/coordinated Demand Side Management

One of the main tasks of the HVAC Industry Leadership Task Force is to improve integrated DSM through more active involvement in state and national projects. See Section 5.c., above, for more discussion.

f) Integration across resource types (energy, water, air quality, etc.)

This Program will keep engaged in the evaluation of water issues related to evaporative cooling technologies (i.e., water quality, availability, etc.)

g) Pilots

Pilot program and project activities required to establish improved HVAC energy efficiency and DR benefits will be considered and implemented throughout the course of the 2009-2011 program cycle. These pilots will be part of the continuous improvement process that seeks to keep the program evolving to address new and innovative technologies. One such pilot is the Hot/Dry Air Conditioning Pilot described in Section 5.e., above.

h) EM&V

To support the continuous improvement envisioned by the adaptive management process and to fully address the intricacies of the program design, continuous EM&V will be established to provide timely feedback on the effectiveness of program

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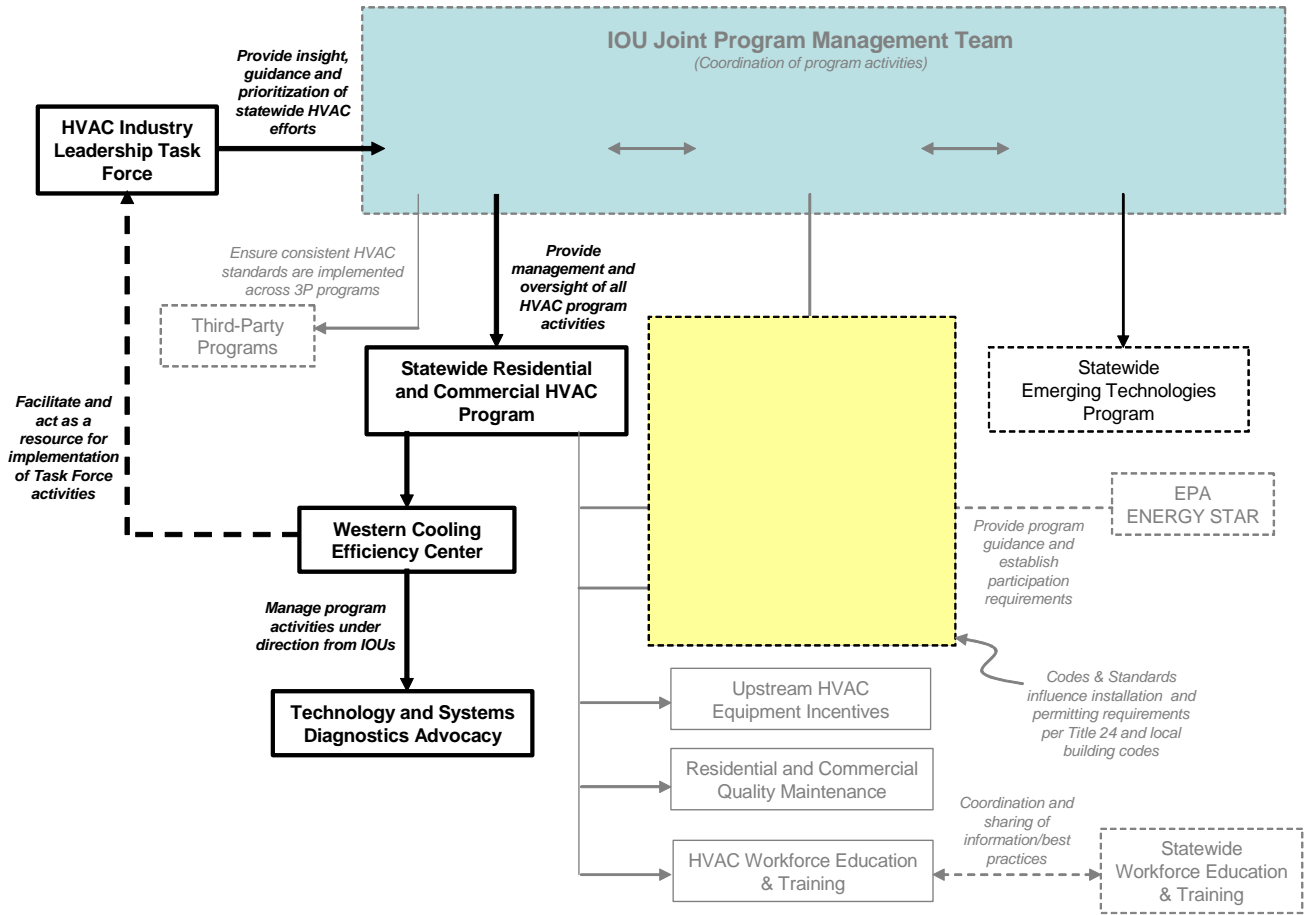
implementation tactics. Detailed plans for process evaluations and other evaluation efforts specific to this sub-program will be developed after the final program design is approved by the CPUC and program implementation has begun, since final plans will be based on identified program design and implementation issues and questions. However, a brief description of the current, preliminary plans is provided here.

Beginning small, with the involvement of the funding IOUs, the managing WCEC, and the CPUC as initial participants, we suggest that a set of evaluation priorities be developed in parallel to the WCEC's organization and prioritization of the various projects enumerated in this plan. Going forward into 2010 and 2011, if a process evaluation has been decided upon, it should be focused on the effectiveness of the various group processes that are implied in the plan, and certain relatively "hard" measurement criteria ought to be developed with respect to, for example:

- The transfer of new diagnostic techniques and standards into the QI/QM programs and the extent to which adoption/compliance actually occurs.
- The extent of effective interaction with the ETP and the Codes and Standards Program.
- The effectiveness of translation of program outputs into HVAC WE&T training curricula.

HVAC: HVAC Technologies and System Diagnostics Advocacy

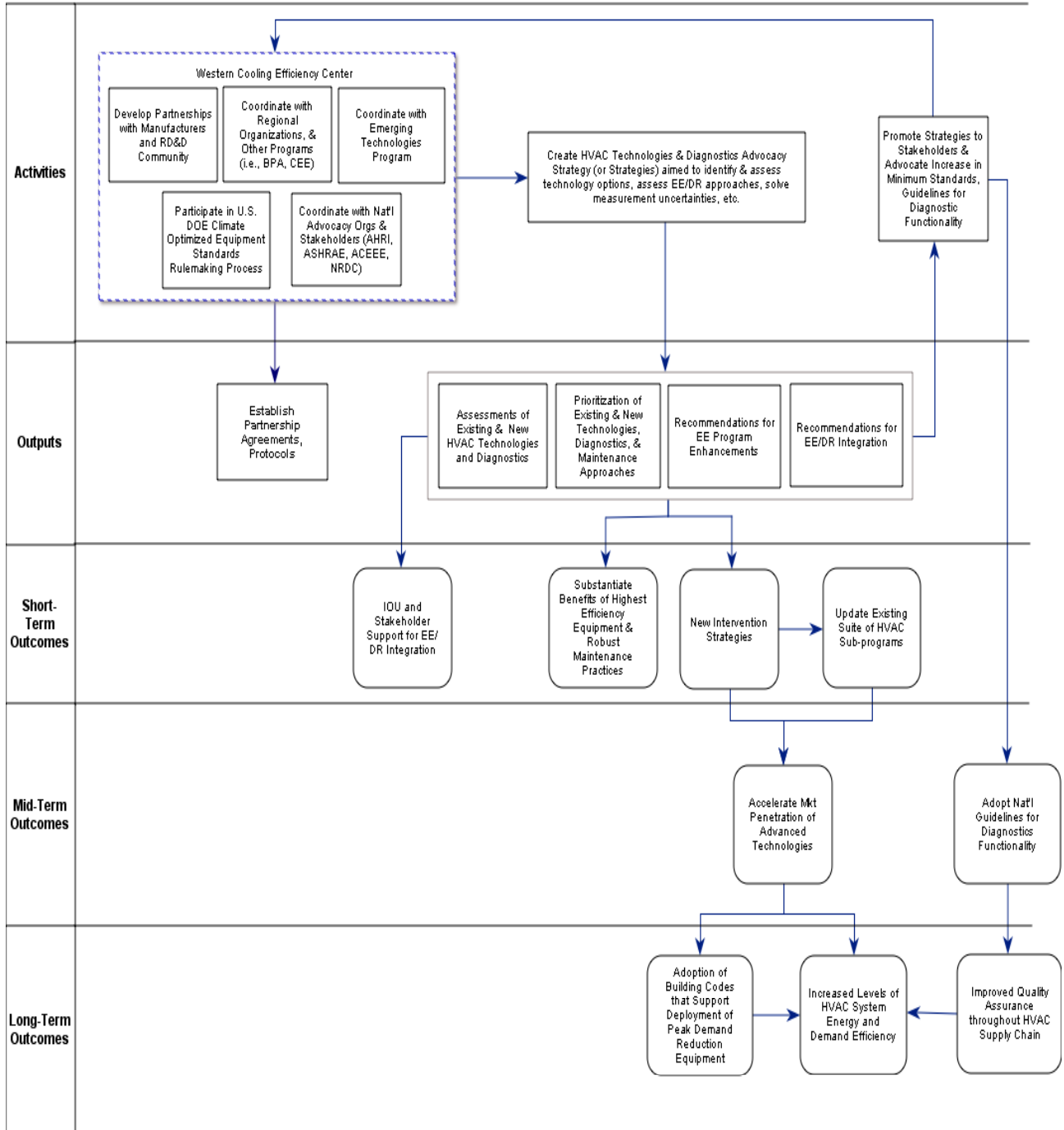
7. Diagram of Program



HVAC: HVAC Technologies and System Diagnostics Advocacy

8. Program Logic Model:

Program: Residential & Commercial HVAC Program
 Sub Program: HVAC Technologies and System Diagnostics Advocacy



7c

HVAC: Commercial Quality Installation

1. **Program Name:** Commercial Quality Installation
Program Type: Core

2. **Projected Program Budget Table**

Table 1 - reference the core program for budget details

3. **Projected Program Gross Impacts Table – by calendar year**

Table 2 - reference the core program for projected gross impact details

4. **Program Description**

a) **Describe program**

This sub-program is applicable to installations of packaged HVAC systems, with a rated capacity up to 760,000 BTU/H. Through this sub-program, a financial incentive will be available to contractors who complete a system installation in accordance with the appropriate industry standards (e.g., ACCA, SMACNA and ASHRAE).

Contractors will be actively recruited into the program by offering them the opportunity to receive financial and performance incentives such as utility co-branding opportunities, diagnostic equipment for reaching specific performance milestones, and assistance aligning with the ENERGY STAR® Service & Product Provider program.

b) **List measures**

The following incentives will be available through the sub-program:

QI Requirement	Incentive
Equipment Sizing and Selection	\$150 per system
Equipment Installation	\$250 per system
Duct Distribution and Air Balance	\$300 per duct system
System Documentation	\$50 per system

c) **List non-incentive customer services**

The following non-incentive services will be offered through this sub-program:

- Active enrollment and promotion of qualified contractors (i.e., those who maintain a minimum of 70 percent of their technician workforce with current Industry Competency Exam (ICE) and/or North American Technician Excellence (NATE) certification or similar proof of proficiency, such as AABC, NBI, NEBB, TABB or state recognized Journeyman Mechanic certification).
- Co-branded customer-oriented marketing materials for contractors.
- IOU promotion of QI through Non-Residential audits and other customer marketing.
- Contractor incentives to encourage participation (e.g., co-op marketing assistance, participation bonuses, etc.)

HVAC: Commercial Quality Installation

- Contractor training on quality installation practices, selling and marketing QI/QM, service management of QI/QM, etc.

5. Program Rationale and Expected Outcome

a) Quantitative Baseline and Market Transformation Information

By its nature, market transformation occurs as a result of numerous factors and programs, not single sub-programs. Therefore, all metrics are proposed at the program level. Please refer to the quantitative baseline and market transformation discussion, presented in the overall program PIP.

Table 3 – Refer to the overarching program for quantitative baseline metrics

b) Market Transformation Information

By its nature, market transformation occurs as a result of numerous factors and programs, not single sub-programs. Therefore, all metrics and goals are proposed at the program level. Please refer to the quantitative baseline and market transformation discussion, presented in the overall program PIP.

Table 4 – Refer to the overarching program for market transformation metrics

c) Program Design to Overcome Barriers

Recent studies indicate that 30 to 50 percent of existing systems have not been installed properly. Further, According to a recent study²⁷, Title 24 compliance rates for commercial replacement systems are less than 2 percent. The net effect of this market failure is a 20 to 30 percent increase in space energy use²⁸. This market failure is due in part to customers making equipment replacement choices based on low first cost, which commonly results in a poor quality installation that is completed without a permit.

The program will address the following barriers:

- Product cost: Substantial incentives for equipment and QI will offset a substantial percentage of the product costs. Customers will be encouraged to participate in the program and use one of the qualified program contractors to install their new HVAC system.
- Lack of awareness: Focused marketing and training on QI and code compliance for consumers, contractors, and building inspectors²⁹ will ensure that the importance of complying with Title 24 will be better understood by program participants. Additionally, requiring demonstrated code compliance (e.g., through submittal of the applicable Title 24 mechanical acceptance forms, MECH-1-A through MECH-8-A) in order to qualify for program rebates will further reinforce the importance of permitted installations.

²⁷ Quantec LLC, “Statewide Codes and Standards Market Adoption and Noncompliance Rates,” pp. 4

²⁸ Strategic Plan, Appendix A, HVAC Convener Report, pp. 38-39

²⁹ See the HVAC WE&T Sub-program PIP, below, for more information.

HVAC: Commercial Quality Installation

- Information or search costs: Active support of qualified program contractors will increase consumer confidence in having a reliable source of quality contractors. Moreover, satisfied customers will recommend these contractors to business associates, thus creating additional momentum for using contractors with a reputation for high-quality work.
- Transaction costs: Streamlined incentive application processes that require the same information required for Title 24 compliance (e.g., through submittal of the Title 24 mechanical acceptance forms mentioned above) will reduce the difficulty of participating in the program and complying with permit requirements.
- Hidden costs: Promoting the concepts and establishing the value proposition of quality maintenance at the time of system installation will increase the likelihood that customers will understand the energy efficiency performance benefits resulting from maintenance and will continue such periodic maintenance over the life of their system.

d) Quantitative Program Targets

The targets provided herein are best estimates, but nonetheless are forecasts.

Table 5

Program Name	Program Target by 2009	Program Target by 2010	Program Target by 2011
Contractor Information Sessions	2	10	20
Participating Contractors	5	30	45
Systems Installed	0	300	900

e) Advancing Strategic Plan goals and objectives

The program will help to achieve the following near-term strategic goals as identified in Chapter 6 of the Strategic Plan:

2-1: Create a Statewide QI/QM Brand

Leveraging ENERGY STAR® brand equity is a cost-effective approach to introducing an immediate QI brand. Additional efforts will be dedicate to evaluating whether a California-specific brand is viable.

2-2: Launch Statewide Brand

IOU sponsored co-branding efforts will be developed based on the branding activity and made available to contractors for promotion of the QI/QM effort.

2-3: Provide expanded QI/QM training

In order to participate in the program, contractors will be required to attend specific training sessions that introduce them to the appropriate industry standards (e.g.,

HVAC: Commercial Quality Installation

ACCA, SMACNA, and ASHRAE).³⁰

2-4: Implement contractor accreditation program

Additional benefits will be made available through the sub-program to support the HVAC WE&T sub-program's efforts toward increasing the level of technician certification. Such efforts may include, but are not limited to, additional IOU promotion of contractors (e.g., "Gold Star Contractors") who maintain a minimum percentage of NATE-certified technicians, reimbursement of testing costs, and/or continuing education units (CEUs) for participating contractors.

6. Program Implementation

a) Statewide IOU Coordination

All California IOUs will offer the Commercial QI Program in a consistent manner. Specific areas of coordination include:

i. Program name: Commercial Quality Installation Program.

ii. Program delivery mechanisms

The IOUs will manage this sub-program through a combination of third-party programs and internal administrative staff, and will follow the adaptive management process discussed in the core Residential and Commercial Statewide HVAC Program PIP, above. The program will be targeted to consumers and contractors to create a push/pull dynamic that influences sustained market changes.

iii. Incentive levels

See Section 4.b., above.

iv. Marketing and outreach plans

In order to support Statewide branding activities, the IOUs will develop common outreach materials. These materials will only be available to participating contractors and will allow for co-branding with the contractor name. Additional point-of-sale information on QI/QM will be made available for equipment dealer locations and building departments.

v. IOU program interactions

In order to support the need for increased code compliance, the sub-program will cooperate with CEC training and enforcement activities targeted at local building departments. Such activities will also be used to promote the economic and performance benefits of QI/QM. The sub-program will also coordinate its activities with IOU local government partnerships, third-party programs and Codes and Standards activities to ensure that code compliance becomes fully integrated into these programs.

³⁰ See the HVAC WE&T Program PIP, below, for more discussion about QI training.

vi. Similar IOU and POU programs

In order to promote the holistic approach proposed herein, the California IOUs propose to initiate a Statewide IOU/POU coordinating group — perhaps under the auspices of CEE or some other umbrella organization — to discuss and implement HVAC program best practices that advance the strategic goals of the Strategic Plan throughout California.

b) Program delivery and coordination

The program will be coordinated with the following activities:

i. Emerging Technologies program

Insofar as emerging HVAC technologies provide a cost-effective solution for commercial customers, the Commercial QI Program will support the installation of those systems.

ii. Codes and Standards program

Efforts will be coordinated to ensure that a consistent message is delivered regarding code compliance and QI/QM. The Codes and Standards Program will take the lead on compliance items, while the Commercial QI Program will take the lead on QI/QM efforts but will leverage similar delivery channels to increase effectiveness. Additionally, coordination activities will be realized through the Joint Program Management Team as described in the core Residential and Commercial HVAC Program PIP.³¹

iii. WE&T efforts

Participating contractors will be required to attend program-specific QI/QM training in order to participate in the program.³²

iv. Program-specific marketing and outreach efforts

Co-branded marketing support will be available for participating contractors in order to promote the Statewide QI/QM efforts. Such support will include exclusive promotion on IOU websites, brochures and other leave-behind materials that contractors can use to promote QI/QM and their involvement with the program. Additional general promotional materials, such as point-of-sale displays for equipment dealers and local building departments, will also be developed.³³

v. Non-energy activities of program

The direct energy benefits of the program result from the quality installation of packaged HVAC systems. Other activities will be required to support these energy savings goals, including significant efforts toward contractor training and consumer marketing.

³¹ For additional information about specific Codes and Standards HVAC activities, see Section 6 of the Codes and Standards PIP.

³² See the HVAC WE&T sub-program PIP, below, for more information.

³³ Specific IOU budget information for this marketing activity is provided in Table 1, above.

HVAC: Commercial Quality Installation

vi. Non-IOU programs

CEE has recently re-launched its commercial HVAC program. Its first task has been to review its existing commercial QI specification. The IOUs will take an active role in this process to ensure that California's quality needs are appropriately reflected in the specification.

vii. CEC work on PIER

See Section 6.b.i., above.

viii. CEC work on Codes and Standards

In a similar manner as with the Codes and Standards Program, the Commercial QI Program will work in cooperation with CEC training and compliance efforts targeted at local building departments. The Codes and Standards Program will take the lead on this effort.⁴

ix. Non-utility market initiatives

The tenets of QI/QM are being actively pursued through the HVAC industry. The Air Conditioning Contractors of America (ACCA) has taken the lead in this national effort by developing various ANSI-recognized QI/QM standards. These standards have been widely adopted throughout the industry (e.g., AHRI, ASHRAE, CEE, ENERGY STAR®, utilities, etc.). The IOUs will remain engaged in these efforts and work to influence the development of increasingly higher standards.

c) Best Practices

The use of industry-accepted design and construction standards represents a "best practice" in air conditioning system installations. Industry standards have been developed and vetted by national committees of industry experts and represent the best available information to use for program design. Additionally, networking through organizations such as CEE and the HVAC Industry Leadership Task Force will provide opportunities for frequent feedback on QI efforts being implemented within California and across the country.

d) Innovation

Delivering this program through active partnership with the industry will increase the likelihood of its success. Such partnership will include the development of co-branded marketing materials and the active promotion of participating contractors. Historically, IOUs have resisted recommending contractors due to liability issues, but introducing stringent participation requirements and effective training will help to mitigate these issues. Additional innovation is likely to result from a continuous improvement process that will be employed to evaluate the viability of offering additional incentives for installations that exceed established program standards (e.g., National Comfort Institute standards).

e) Integrated/coordinated Demand Side Management

As with most HVAC-oriented programs, the primary source of integration exists between energy efficiency and DR activities. At a minimum, all marketing materials developed to support QI/QM will cross-promote DR to educate customers on the availability of IOU DR programs. The required contractor training will be designed to include a discussion on DR programs, and participating contractors will be required to deliver DR information as part of their customer sales efforts. Finally, contractors will be encouraged to facilitate customer participation in DR programs by including a DR program application with the owner documents provided at the completion of the system installation. Additional work will take place during the 2009-2011 program cycle to evaluate closer linkages between EE and DR.

f) Integration across resource types (energy, water, air quality, etc)

The program can be designed to support CARB's efforts to regulate GHGs by supporting the early adoption of equipment designed to operate using R-410a refrigerants. As CARB introduces further regulation of refrigerants, the program will adopt these regulations ahead of their formal introduction.

g) Pilots

No pilot programs are planned as part of this effort, though activities associated with improving QI may be piloted before full implementation to ensure more coherent market adoption on roll-out.

h) EM&V

To support the continuous improvement envisioned by the adaptive management process and to fully address the intricacies of the program design, continuous EM&V will be established to provide timely feedback on the effectiveness of program implementation tactics. Detailed plans for process evaluations and other evaluation efforts specific to this program will be developed after the final program design is approved by the CPUC and program implementation has begun, since final plans will be based on identified program design and implementation issues and questions. However, a brief description of the current, preliminary plans is provided here.

As noted earlier, key parameters relevant to both the progress of program activities and market transformation will need initial development as part of program operations, and should begin early in 2009 with data collection and analysis or meta-analysis as described in Section 5, above. These can be made part of a more general process evaluation effort, which can and should be used to provide qualitative and quantitative feedback to the program, as well as establishing key estimates that will be needed in support of impact evaluations and further planning.

Also as noted in Section 5 above, a variety of estimates ought to be developed from a combination of shipment data, onsite surveys, customer and contractor surveys, building permit data bases, and State or industry data bases. The initial work in 2009 will establish estimates relating to the efficiency of new installations, permit issuance,

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contractor/technician certification, contractor availability by territory/climate zone, installations versus repairs, new installation quality (per appropriate ACCA, SMACNA or ASHRAE standards), and customer/contractor awareness of key quality related parameters. Certain of these estimates will be required going forward for assessment of progress in terms of program activity and (particularly) transformative change.

Although the studies considered here are not impact evaluations, it will be appropriate to obtain ongoing information on the importance of the incentive, at given levels, in determining customer decisions to install qualifying equipment. This work, which might be carried out with a short battery of survey items, or a joint-oriented survey, may help to correct the program in terms of the incentive amount actually necessary to effectively recruit customers when combined with other benefits communicated to customers through the contractor and other marketing mechanisms.

As is true for the entire Residential and Commercial HVAC Program, a great deal of organizational and inter-organizational activity is planned, under the general rubric of “adaptive management.” With IOUs and third-party organizations managing and implementing this program, other involved (or potentially involved) organizations include a proposed HVAC Industry Leadership Task Force, an IOU Joint Program Management Team primarily composed of IOU program managers, CEC, Local Government Partnership Programs, Codes and Standards staff, and utility and regulatory stakeholders. The relationships (or potential relationships) have promise for fruitful integration, and a qualitative process evaluation approach documenting the reasons that relationships are working or not working will be useful in optimizing the emergent structure.

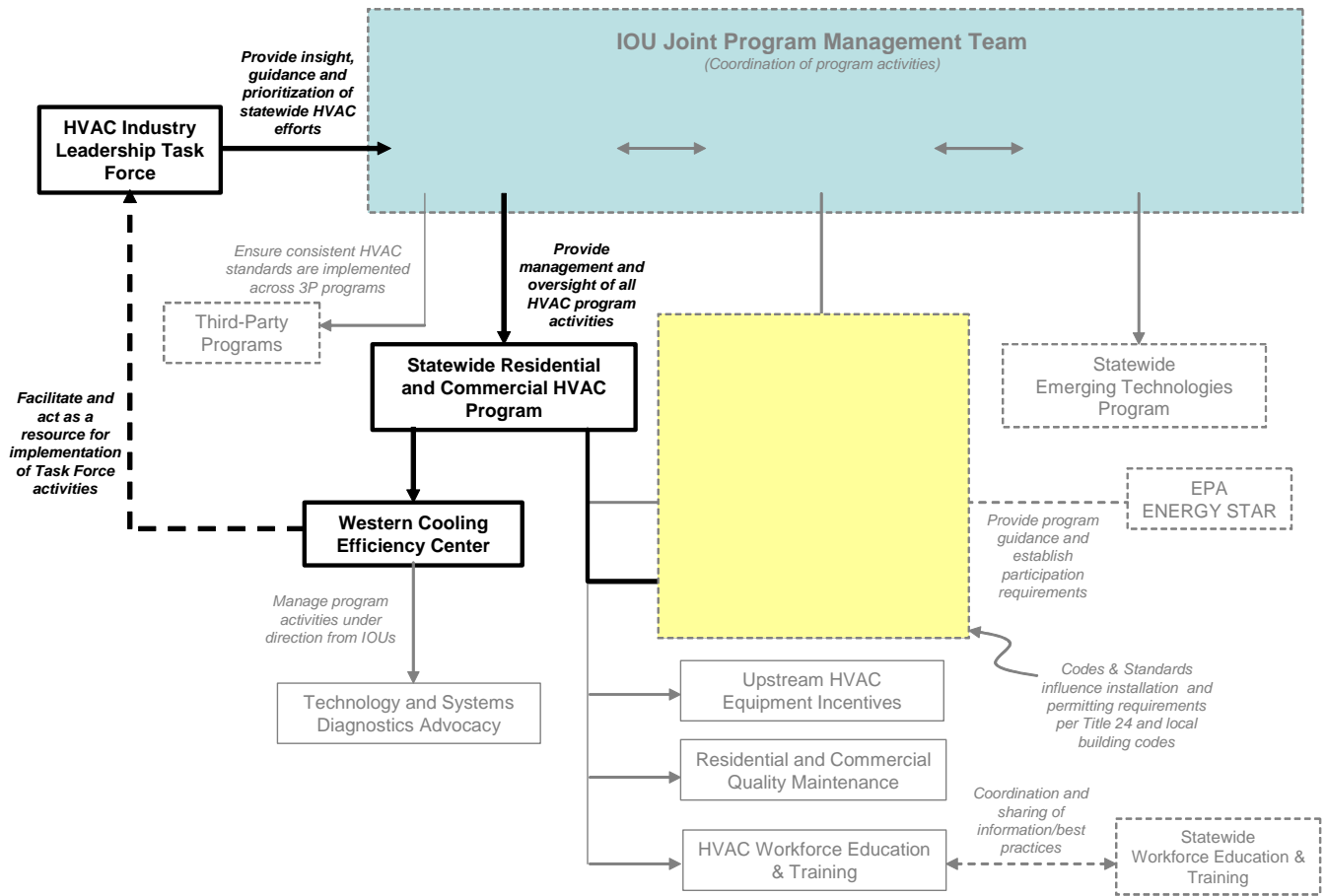
In addition to the above research and evaluation issues, certain key outcomes or relationships relevant to program theory are implied by the program plan, and deserve mention as researchable topics:

- Issues relating to co-branding efforts, including process issues and actual relevance of the branding to contractor or customer behavior.
- The effectiveness of expanding QI/QM training.
- The extent to which incentives are effective in expanding participation, and the degree to which this connects with the efficiency of installations.
- The effectiveness of the program in routing customers to other programs, particularly DR (cycling programs in particular), and the reverse. (Note that cycling program tracking data, and cycling program technician visits, may be an excellent source of leads to the QI program).

Finally, although not intended to serve as a substitute for impact evaluation, inexpensive billing analysis approaches may be carried out in order to frame the range of reasonable expectations from a quality installation in specific residential circumstances. This preliminary work can easily be undertaken on an ongoing basis by IOU staff or consultants.

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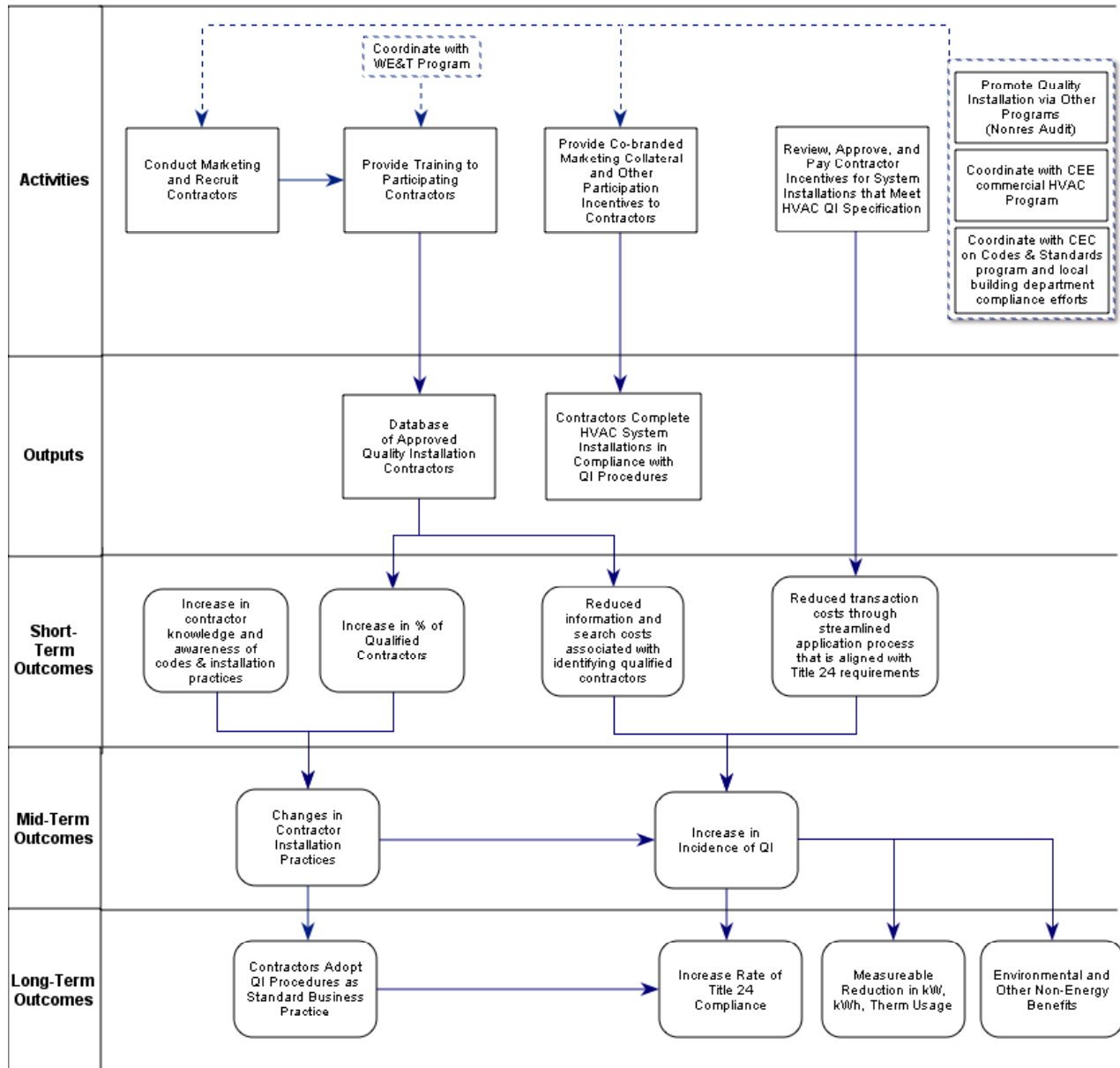
7. Diagram of Program



HVAC: Commercial Quality Installation

8. Program Logic Model

Program: Residential & Commercial HVAC Program
Sub Program: Commercial Quality Installation Program



7d

HVAC: Energy Star® Residential Quality Installation Program

1. Program Name: ENERGY STAR® Residential Quality Installation Program
Program Type: Core

2. Projected Program Budget Table

Table 1 - reference the core program for budget details

3. Projected Program Gross Impacts Table – by calendar year

Table 2 - reference the core program for projected gross impact details

4. Program Description

a) Describe program

This sub-program is applicable to installations of central air conditioning (CAC) systems and air-source heat pump (HP) systems, with a rated capacity up to 65,000 BTU/H. Through this sub-program, a financial incentive will be available to homeowners who have a system installed in accordance with the EPA HVAC Quality Installation Guidelines. The installation requirements are illustrated in detail in *ANSI/ACCA 5 QI-2007: HVAC Quality Installation Specification*. In addition to this incentive, homeowners will also receive an ENERGY STAR® certificate for their qualifying installation. Contractors will be actively recruited into the sub-program by being offered the opportunity to receive performance incentives, such as utility co-branding opportunities, and diagnostic equipment for reaching specific performance milestones.

b) List measures

The following incentives will be available through the sub-program:

Equipment Type	Level	SEER	EER	HSPF	Equipment Incentive	QI Incentive*
Split Central CAC	Minimum	13	-	-	\$ 0	\$750
	Tier 1	14.5	12	-	\$250	\$750
	Tier 2	15	12.5	-	\$500	\$750
Packaged CAC	Minimum	13	-	-	\$ 0	\$750
	Tier 1	14	11	-	\$250	\$750
	Tier 2	14 or higher	12 or higher	-	\$500	\$750
Split Heat Pump	Minimum	13	-	7.7	\$ 0	\$750
	Tier 1	14.5	12	8.5	\$250	\$750
	Tier 2	15 or higher	12.5 or higher	8.5 or higher	\$500	\$750
Packaged Heat Pump	Minimum	13	-	7.7	\$ 0	\$750
	Tier 1	14	11	8	\$250	\$750
	Tier 2	14 or higher	12 or higher	8 or higher	\$500	\$750

HVAC: Energy Star® Residential Quality Installation Program

**QI incentives for minimum standard equipment will be offered initially to support the market transformation aspects of the Statewide HVAC initiative with the goal of making QI common practice. As QI becomes the norm, incentives for minimum standard equipment will be eliminated in order to drive the installation of higher SEER/EER equipment.*

c) List non-incentive services

The following non-incentive services will be offered through this sub-program:

- Active enrollment and promotion of qualified contractors (i.e., those who maintain a minimum of 70 percent of their technician workforce with current Industry Competency Exam (ICE) and/or North American Technician Excellence (NATE) certification or similar proof of proficiency, such as AABC, NBCNEBB, TABB, STAR, or state-recognized Journeyman Mechanic certifications).
- Co-branded customer-oriented marketing materials for contractors.
- IOU promotion of QI through residential audits and other customer marketing.
- Contractor incentives to encourage participation (e.g., co-op marketing assistance, participation bonuses, etc.).
- Contractor training on quality installation practices.

5. Program Rationale and Expected Outcome

a) Quantitative Baseline and Market Transformation Information

By its nature, market transformation occurs as a result of numerous factors and programs, not single sub-programs. Therefore, all metrics are proposed at the program level. Please refer to the quantitative baseline and market transformation discussion, presented in the overall program PIP.

Table 3 – Refer to the overarching program for quantitative baseline metrics

b) Market Transformation Information

By its nature, market transformation occurs as a result of numerous factors and programs, not single sub-programs. Therefore, all metrics and goals are proposed at the program level. Please refer to the quantitative baseline and market transformation discussion, presented in the overall program PIP.

Table 4 – Refer to the overarching program for market transformation metrics

c) Program Design to Overcome Barriers

Recent data available from AHRI indicates that as a result of the 2006 increase in federal residential equipment efficiency standards, which increased equipment costs significantly, unitary equipment sales have dropped while repairs to existing systems (low efficiency compressor replacement) have increased nationwide by more than 25 percent and window unit sales have increased by a similar amount. A similar trend occurred in 2002 when ENERGY STAR increased its qualifying efficiency level to Seasonal Energy Efficiency Rating (SEER) 13. Prior to the change, ENERGY STAR Central Air Conditioner (CAC) sales had an average market share of 33 percent³⁴.

³⁴ Itron, "California Residential Efficiency Market Share Tracking," 2006, pp.3-6.

HVAC: Energy Star® Residential Quality Installation Program

After the change, the average market share of ENERGY STAR units fell to 7 percent. Additionally, recent studies indicate that 30 to 50 percent of existing systems have not been installed properly. Further, Title 24 compliance rates for replacement systems are approximately 10 percent³⁵. The net effect of this market failure is a 20 to 30 percent increase in space energy use³⁶.

The program will address the following barriers:

- **Product cost:** Substantial incentives for equipment and QI will offset a substantial percentage of product costs. Customers will be encouraged to participate in the program and use one of the qualified program contractors to install their new HVAC system.
- **Lack of awareness:** Focused marketing and training on QI and code compliance for consumers, contractors, and building inspectors³⁷ will ensure that the importance of complying with Title 24 will be better understood by program participants. Additionally, requiring demonstrated code compliance (e.g., CF-6R) in order to qualify for program rebates will further reinforce the importance of permitted installations.
- **Information or search costs:** Active support of qualified program contractors and listing them on IOU websites will increase consumer confidence in having a reliable source of quality contractors. Moreover, satisfied customers will recommend these contractors to friends and neighbors and thus create additional momentum for using contractors with a reputation for high-quality work.
- **Transaction costs:** Streamlined incentive application processes that require the same information required for Title 24 compliance (e.g., CF-6R) will reduce the difficulty of participating in the program and complying with permit requirements. Furthermore, the high incentive levels offered by the program will reduce the likelihood that customers will choose not to participate in the QI activity.
- **Hidden costs:** Promoting the concepts of QM at the time of system installation will increase the likelihood that customers will understand the energy efficiency performance benefits resulting from maintenance, and will continue such periodic maintenance over the life of their system.

d) Quantitative Program Targets

The targets provided herein are best estimates, but nonetheless are forecasts.

Table 5

Program Name	Program Target by 2009	Program Target by 2010	Program Target by 2011
Contractor Information Sessions	2	10	20
Participating	5	30	45

³⁵ Quantec LLC, "Statewide Codes and Standards Market Adoption and Noncompliance Rates," pp. 4

³⁶ Strategic Plan, Appendix A, HVAC Convener Report, pp. 38-39

³⁷ See the HVAC WE&T Sub-program PIP, below, for more information.

HVAC: Energy Star® Residential Quality Installation Program

Program Name	Program Target by 2009	Program Target by 2010	Program Target by 2011
Contractors			
Systems Installed	0	300	900

e) Advancing Strategic Plan goals and objectives

The program will help to achieve the following near-term strategic goals as identified in Chapter 6 of the Strategic Plan:

2-1: Create a Statewide QI/QM Brand

Leveraging ENERGY STAR® brand equity is a cost-effective approach to introducing an immediate QI brand. Additional efforts will be dedicated to evaluating whether a California-specific brand is viable.

2-2: Launch Statewide Brand

IOU-sponsored co-branding efforts will be developed based on the branding activity and made available to contractors for promotion of the QI/QM effort.

2-3: Provide expanded QI/QM training

In order to participate in the program, contractors will be required to attend specific training sessions that introduce them to the *ANSI/ACCA 5 QI-2007: HVAC Quality Installation Specification*.³⁸

2-4: Implement contractor accreditation program

Additional benefits will be made available through the sub-program to support the HVAC WE&T sub-program's efforts toward increasing the level of technician certification. Such efforts may include, but are not limited to, additional IOU promotion of contractors (e.g., "Gold Star Contractors") who maintain a minimum percentage of NATE-certified technicians, reimbursement of testing costs, and/or continuing education units (CEUs) for participating contractors.

6. Program Implementation

a) Statewide IOU Coordination

All California IOUs will offer the ENERGY STAR® Residential QI Program in a consistent manner. Specific areas of coordination include:

- i. Program name:** ENERGY STAR® Residential Quality Installation Program.

³⁸ See the HVAC WE&T Program PIP, below, for more discussion about QI training.

HVAC: Energy Star® Residential Quality Installation Program

ii. Program delivery mechanisms

The IOUs will manage the program through a combination of third-party programs and internal administrative staff, and will follow the adaptive management process discussed in the core Residential and Commercial HVAC Program PIP, above. The program will be targeted to consumers and contractors to create a push/pull dynamic that influences sustained market changes.

iii. Incentive levels

See Section 4.b., above.

iv. Marketing and outreach plans

In order to support the Statewide branding activities, common outreach materials will be developed by the IOUs in partnership with ENERGY STAR®. These materials will only be available to participating contractors and will allow for co-branding with the contractor name. Additional point-of-sale information on QI/QM will be made available for equipment dealer locations and building departments.

v. IOU program interactions

In order to support the need for increased code compliance, the program will cooperate with CEC training and enforcement activities targeted at local building departments. Such activities will also be used to promote the economic and performance benefits of QI/QM. The program will also coordinate its activities with IOU local government partnerships and third-party programs, to ensure that code compliance becomes fully integrated into these programs.

vi. Similar IOU and POU programs

The ENERGY STAR® Residential QI program was introduced in early 2008. Several utilities, including Oncor, National Grid, Nstar, and Puget Sound Energy, are either offering or planning to offer this program. Both PG&E and SCE piloted the program in 2006 and 2007 respectively. In order to promote the holistic approach proposed herein, the California IOUs propose to initiate a Statewide IOU/POU coordinating group — perhaps under the auspices of CEE or some other umbrella organization — to discuss and implement HVAC program best practices that advance the goals of the Strategic Plan throughout California.

b) Program delivery and coordination

The program will be coordinated with the following activities:

i. Emerging Technologies program

N/A (this program does not seek to influence emerging technologies).

ii. Codes and Standards program

Efforts will be coordinated to ensure that a consistent message is delivered regarding code compliance and QI/QM. Codes and Standards will take the lead on compliance items, while the ENERGY STAR® Residential QI Program will take

HVAC: Energy Star® Residential Quality Installation Program

the lead on QI/QM efforts but will leverage similar delivery channels to increase effectiveness. Additionally, coordination activities will be realized through the Joint Program Management Team as described in the core Residential and Commercial HVAC PIP, above.³⁹

iii. WE&T efforts

Participating contractors will be required to attend program-specific QI/QM training in order to participate in the program.⁴⁰

iv. Program-specific marketing and outreach efforts

Co-branded marketing support will be available for participating contractors in order to promote the Statewide QI/QM efforts. Such support will include exclusive promotion on IOU websites, brochures, and other leave-behind materials that contractors can use to promote QI/QM and their involvement with the program. Additional general promotional materials, such as point-of-sale displays for equipment dealers and local building departments, will also be developed.⁴¹

v. Non-energy activities of program

The direct energy benefits of the program result from the quality installation of central air conditioning systems. Other activities will be required to support these energy savings goals. These activities include significant efforts in contractor training and consumer marketing.

vi. Non-IOU programs

Federal tax credits are available for qualifying equipment (that is, equipment that meets CEE Tier 2 levels).

vii. CEC work on PIER

N/A (this program does not seek to influence emerging technologies.)

viii. CEC work on Codes and Standards

In a similar manner as with the Codes and Standards Program, the ENERGY STAR® Residential QI Program will work in cooperation with CEC training and compliance efforts targeted at local building departments. The Codes and Standards Program will take the lead on this effort.⁴²

ix. Non-utility market initiatives

The tenets of QI/QM are being actively pursued through the HVAC industry. The Air Conditioning Contractors of America (ACCA) has taken the lead in this

³⁹ For additional information about specific Codes and Standards HVAC activities, see Section 6 of the Codes and Standards PIP.

⁴⁰ See the HVAC WE&T sub-program PIP, below, for more information.

⁴¹ Specific IOU budget information for this marketing activity is provided in Table 1, above.

⁴² For additional information about Codes and Standards HVAC activities, see Section 6 of the Codes and Standards PIP.

HVAC: Energy Star® Residential Quality Installation Program

national effort by developing various ANSI recognized QI/QM standards. These standards have been widely adopted throughout the industry (e.g., AHRI, ASHRAE, CEE, ENERGY STAR®, utilities, etc.) The IOUs will remain engaged in these efforts and work to influence the development of increasingly higher standards.

c) Best Practices

ANSI/ACCA 5 QI-2007: HVAC Quality Installation Specification represents a “best practice” in air conditioning system installations. This standard was developed by a national committee of industry experts and has been validated as the sole Quality Installation standard through its ANSI-recognized status. Both PG&E and SCE piloted the use of the QI Standard by partnering with ENERGY STAR® during the 2006-2008 program cycle. The ENERGY STAR® QI program design has been modified based on the results from these pilot programs. Additionally, networking through ENERGY STAR® and organizations like CEE will provide opportunities for frequent feedback on QI efforts being implemented across the country.

d) Innovation

Delivering this program through active partnership with the industry will increase the likelihood of its success. Such partnership will include the development of co-branded marketing materials and the active promotion of participating contractors. Historically, IOUs have resisted recommending contractors due to liability issues, but introducing stringent participation requirements and effective training will help to mitigate these issues. Additional innovation will result through a continuous improvement process that will be employed to evaluate the viability of offering additional incentives for installations that exceed established program standards (e.g., National Comfort Institute standards).

e) Integrated/coordinated Demand Side Management

As with most HVAC-oriented programs, the primary source of integration exists between energy efficiency and DR activities. At a minimum, all marketing materials developed to support QI/QM will cross-promote DR to educate customers about the availability of IOU DR programs. The required contractor training will be designed to include a discussion on DR programs, and participating contractors will be required to deliver DR information as part of their customer sales efforts. Finally, contractors will be encouraged to facilitate customer participation in DR programs by including a completed DR program application with the owner documents provided at the completion of the system installation. Additional work will take place during the 2009-2011 program cycle to evaluate closer linkages between EE and DR.

f) Integration across resource types (energy, water, air quality, etc)

The program can be designed to support CARB’s efforts to regulate GHGs by supporting the early adoption of equipment designed to operate using R-410a refrigerants. As CARB introduces further regulation of refrigerants, the program will adopt these regulations ahead of their formal introduction.

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g) Pilots

No pilot programs are planned as part of this effort.

h) EM&V

To support the continuous improvement envisioned by the adaptive management process and to fully address the intricacies of the program design, continuous EM&V will be established to provide timely feedback on the effectiveness of program implementation tactics. Detailed plans for process evaluations and other evaluation efforts specific to this program will be developed after the final program design is approved by the CPUC and program implementation has begun, since final plans will be based on identified program design and implementation issues and questions. However, a brief description of the current, preliminary plans is provided here.

As noted earlier, key parameters relevant to both the progress of program activities and market transformation will need initial development as part of program operations, and should begin early in 2009 with data collection and analysis or meta-analysis as described in Section 5, above. These can be made part of a more general process evaluation effort, which can and should be used to provide qualitative and quantitative feedback to the program, as well as establishing key estimates that will be needed in support of impact evaluations and further planning.

Also as noted in Section 5, above, a variety of estimates ought to be developed from a combination of shipment data, onsite surveys, customer and contractor surveys, building permit data bases, and State or industry data bases. The initial work in 2009 will establish estimates relating to the efficiency of new installations, permit issuance, contractor/technician certification, contractor availability by territory/climate zone, installations versus repairs, new installation quality (e.g., per ANSI/ACCA 5 QI-2007 or a well-researched set of alternative criteria), and customer and contractor awareness of key quality-related parameters. Certain of these estimates will be required going forward to assess progress in terms of program activity and (particularly) transformative change.

Although the studies considered here are not impact evaluations, it will be appropriate to obtain ongoing information on the importance of the incentive, at given levels, in determining customer decisions to install qualifying appliances. This work, which might be carried out with a short battery of survey items or a joint-oriented survey, may help to correct the program in terms of the incentive amount actually necessary to effectively recruit customers when combined with other benefits communicated to customers through the contractor and other marketing mechanisms.

As is true for the entire Residential and Commercial HVAC Program, a great deal of organizational and inter-organizational activity is planned, under the general rubric of “adaptive management.” With IOUs and third-party organizations managing and implementing this program, other involved (or potentially involved) organizations include a proposed HVAC Industry Leadership Task Force, an IOU Joint Program Management Team primarily composed of IOU program managers, CEC, Local Government Partnership Programs, Codes and Standards staff, and utility and

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regulatory stakeholders. The relationships (or potential relationships) have promise for fruitful integration, and a qualitative process evaluation approach documenting the reasons that relationships are working or not working will be useful in optimizing the emergent structure.

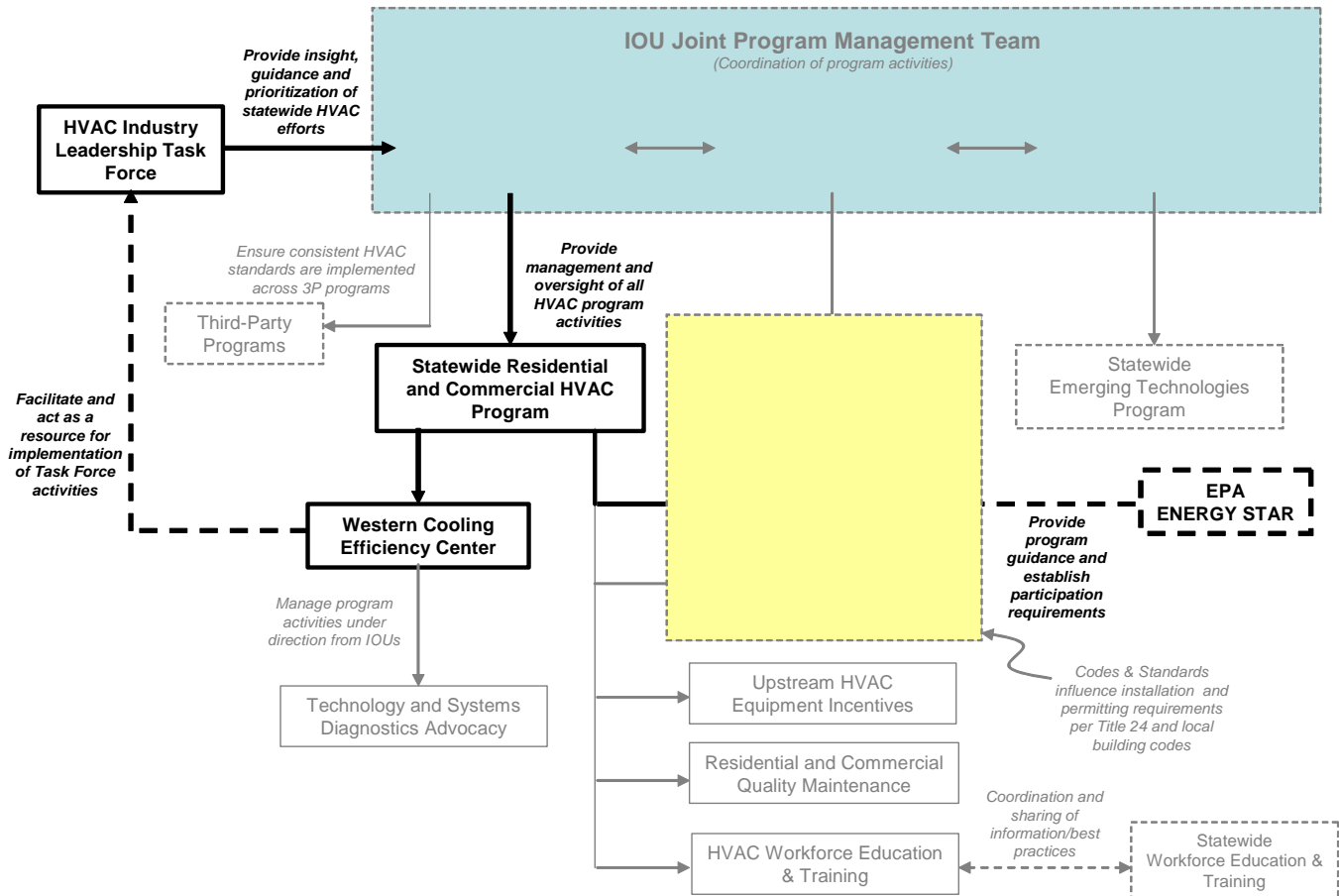
In addition to the above research and evaluation issues, certain key outcomes or relationships relevant to program theory are implied by the program plan, and deserve mention as researchable topics:

- Issues relating to ENERGY STAR® co-branding, including process issues as well as actual relevance of the brand to contractor or customer behavior.
- The effectiveness of expanding QI/QM training.
- The extent to which incentives are effective in expanding participation, and the degree to which this connects with the efficiency of installations.
- The effectiveness of the program in routing customers to other programs, particularly DR (cycling programs in particular), and the reverse. (Note that cycling program tracking data, and cycling program technician visits, may be an excellent source of leads to the ENERGY STAR® QI program).

Finally, although not intended to serve as a substitute for impact evaluation, inexpensive billing analysis approaches may be carried out in order to frame the range of reasonable expectations from a quality installation in specific residential circumstances. This preliminary work can easily be undertaken on an ongoing basis by IOU staff or consultants.

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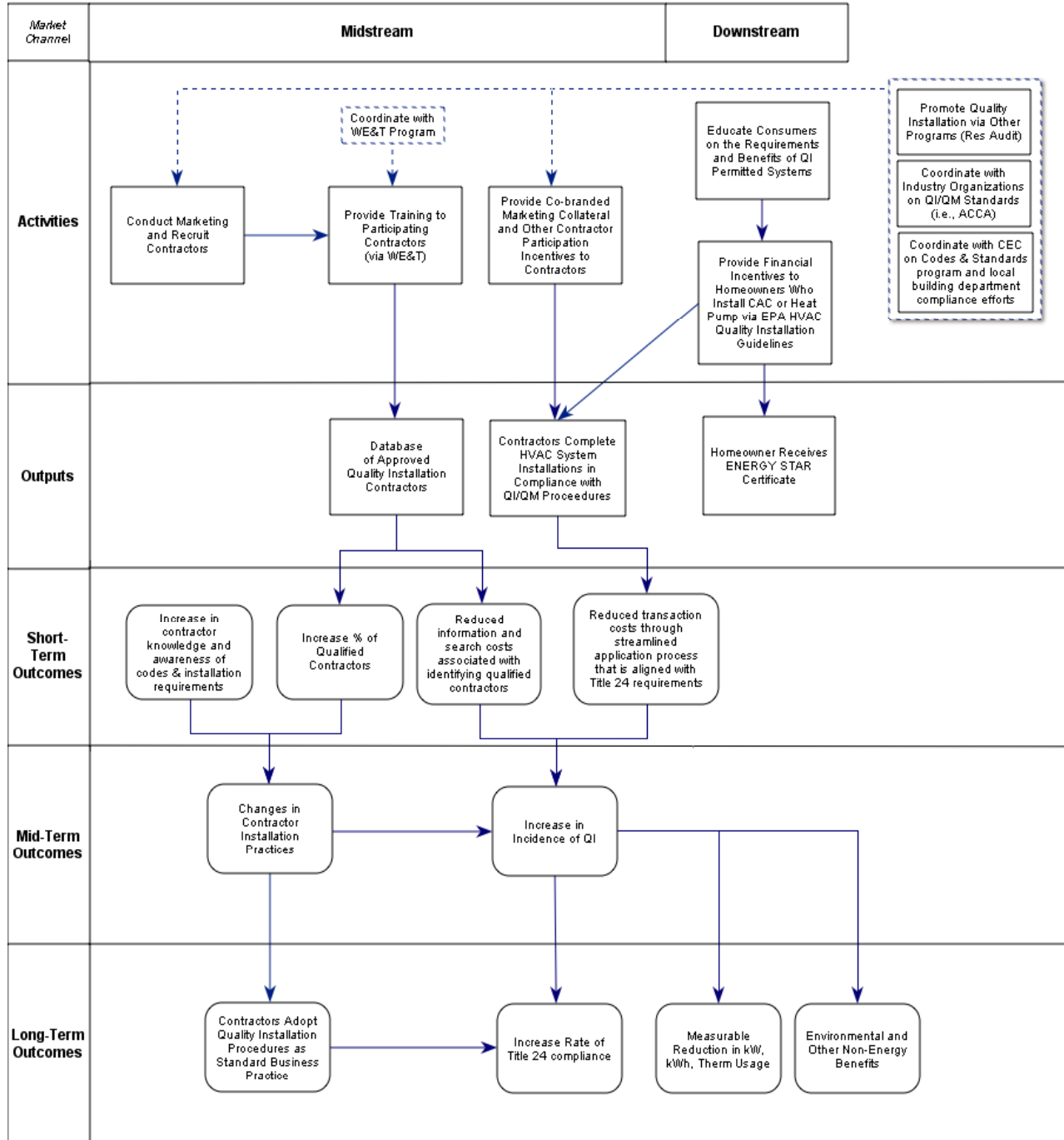
7. Diagram of Program



HVAC: Energy Star® Residential Quality Installation Program

8. Program Logic Model

Program: Residential & Commercial HVAC Program
Sub Program: ENERGY STAR Residential Quality Installation Program



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HVAC: Residential Quality Maintenance and Commercial Quality Maintenance Development

1. Program Name: Residential Quality Maintenance and Commercial Quality Maintenance Development

Program Type: Core

2. Projected Program Budget Table

Table 1- reference the core program for budget details

3. Projected Program Gross Impacts Table – by calendar year

Table 2 - reference the core program for projected gross impact details

4. Program Description

a) Describe program

This sub-program may represent one of the more creative aspects of the HVAC “Big Bold Energy Efficiency Strategies.” It is based on the assumption that energy and demand savings are achievable through the regular application of quality maintenance (QM) procedures⁴³ applied to existing residential and commercial HVAC equipment.

This sub-program intends to:

- Quantify those potential savings; and
- Develop and implement both a residential and commercial maintenance program focused on comprehensive, continuously improving O&M activities that capture those savings and provide a high return on investment to the end-user, thus driving the intense level of market transformation of the HVAC industry envisioned by the Strategic Plan.

b) List measures

At this point, providing a list of measures and incentive levels is premature, as a valid QM-based program must be well planned and vetted through the HVAC industry.

While there is no doubt that a system operates at its most efficient state when refrigerant charge and airflow (RCA) are properly corrected and duct leakage is minimized, energy savings from existing RCA and duct sealing efforts have been less than were originally anticipated. It is unclear what combination of causes is responsible for the lower level of realized savings. Initial HVAC QM efforts will focus on uncovering the root causes, rectifying design and implementation shortcomings, determining realistic savings estimates, and then launching two broad scale QM programs, one residential and one commercial, in 2010.

⁴³ While residential maintenance and unitary commercial maintenance are alike in that the equipment being serviced can be similar in form and function, there are dramatic differences in the ways business is marketed and sold, the depth and breadth of maintenance measures normally provided, and the complexity of the customer-contractor relationship. For that reason, in 2009, two separate Quality Maintenance programs will be developed in collaboration with the HVAC industry and be launched in 2010, one for residential and the other for small commercial. For the sake of brevity, however, throughout this Program Implementation Plan and its Sub-program Plans, “quality maintenance,” whether residential or commercial is simply referred to as “QM.”

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c) List non-incentive measures

This sub-program will be designed during the first year of the 2009-2011 program cycle and therefore will not be providing incentives, at least not initially. The program development process will be performed with industry involvement (under the auspices of the HVAC Industry Leadership Task Force described in the core Residential and Commercial HVAC PIP, above, and in Section 6.a.ii., below) to ensure that:

- The measures eventually included in the program can be reasonably assured to save energy and lower peak demand;
- A clear value proposition can be demonstrated so that contractors will see the path for a profitable business opportunity based on QM and customers will understand the benefits of equipment maintained at a higher level of quality;
- An effective training program will be put in place to ensure that technicians can properly implement QM services; and
- The processes employed will document that work performed in the field meets minimum program quality control standards and can be validated.

5. Program Rationale and Expected Outcome

a) Quantitative Baseline and Market Transformation Information

By its nature, market transformation occurs as a result of numerous factors and programs, not single sub-programs. Therefore, all metrics are proposed at the program level. Please refer to the quantitative baseline and market transformation discussion, presented in the overall program PIP.

Table 3 – Refer to the overarching program for quantitative baseline metrics

b) Market Transformation Information

By its nature, market transformation occurs as a result of numerous factors and programs, not single sub-programs. Therefore, all metrics and goals are proposed at the program level. Please refer to the quantitative baseline and market transformation discussion, presented in the overall program PIP.

Table 4 – Refer to the overarching program for market transformation metrics

c) Program Design to Overcome Barriers

Recent data available from AHRI indicates that as a result of the 2006 increase in federal residential equipment efficiency standards, which increased equipment costs significantly, unitary equipment sales have dropped while repairs to existing systems (i.e., low efficiency compressor replacements) have increased nationwide by more than 25 percent. Essentially, customers are keeping older, inefficient equipment in operation longer, thus impacting the original intent of increasing minimum efficiency standards. Since equipment servicing is occurring at increased levels, it will be incumbent upon this program to ensure that the service is being performed correctly and that the services (1) are appropriate for each unique system (i.e., not cleaning coils just for the sake of cleaning coils) and (2) deliver legitimate energy savings in a cost-effective manner.

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The IOUs have been providing HVAC service-based programs since at least the 2004-05 program cycle. The need has been identified to reconcile conflicting preliminary savings reports, which include the following:

- The recently released draft M&V report for PG&E's 2006-07 RCA and Duct Sealing program indicates that on the order of 50 percent of the systems serviced in the field through the program could not be reliably validated to be operating within manufacturer specifications⁴⁴. SCE's own internal quality control process has indicated similar levels of uncertainty.
- The energy savings for such measures are also questionable. Numerous studies including the latest release of DEER and SCE's 2006-08 RCA Work Paper (WPCSNRH0008.0) – which were informed by lab tests performed at SCE's Refrigeration Technology Test Center – provide conflicting information regarding the savings attributable to certain HVAC services. Additionally, the market evaluation report of the Northwest Energy Efficiency Alliance Small Commercial HVAC Pilot Program concluded that the savings from HVAC services were unreliable⁴⁵. Other studies have concluded that the current tune-up protocols are “incomplete”⁴⁶ and that there may be problems of one kind or another with all of the test methods.⁴⁷
- The current program design elements can potentially encourage improper service by influencing an action that does not necessarily need to be performed just to receive an incentive.⁴⁸

Additionally, several other issues could potentially influence program design, including:

- Traditionally, utility HVAC service programs have addressed the commercial and residential markets with similarly designed and delivered programs. However, these two markets are completely different not only from the perspective of the contractors and customers involved, but also the energy efficiency measures that apply (e.g. Duct Blasters® have limited use in most commercial buildings).
- The California Home Energy Rating System (HERS) Phase II regulation establishes specific technical, quality control and certification requirements for field verification and diagnostic testing of residential HVAC systems. HERS Phase II may be a viable option for diagnosing residential HVAC system efficiency through the existing HERS rater network, but will not be initiated until third quarter 2009. If viable, linking IOU programs with HERS Phase II would more closely align CPUC regulated programs with CEC regulated programs and

⁴⁴ The Cadmus Group, “Residential Retrofit Contract Group First Draft Verification Report,” prepared for the California Public Utilities Commission Energy Division, 2008.

⁴⁵ Energy Market Innovations, “Small Commercial HVAC Pilot Program – Market Progress Evaluation Report,” prepared for Northwest Energy Efficiency Alliance.

⁴⁶ K. Temple and T. Rossi, “Enhanced Refrigeration Diagnostics for an Improved Air Conditioning Tune-up Program,” 2006.

⁴⁷ J. Siegel and C. Wray, “An Evaluation of Superheat-Based Refrigerant Charge Diagnostics for Residential Cooling Systems,” 2002.

⁴⁸ Further complicating this issue is the fact that the initial operating conditions are difficult to confirm and thus there is uncertainty in knowing whether the end state delivered actual energy savings.

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increase the likelihood that the Strategic Plan's market transformation goals will be achieved.

- The American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE) and/or Air Conditioning Contractors of America (ACCA) have recently released ANSI recognized quality maintenance specifications for commercial and residential systems. These specifications need to be evaluated in terms of their energy efficiency benefits to determine if they could be used as the basis for statewide program design.
- Gas heating measures are not adequately represented in the IOU's HVAC service-based programs and need to be fully evaluated to ensure that comprehensive HVAC system maintenance is performed.
- Other organizations such as the National Comfort Institute (NCI) have established processes and procedures to "tune" the performance of HVAC systems to operate in its most efficient state. These processes should be evaluated to determine how well they perform in comparison to minimum QM standards.
- The current method that IOUs use to deliver their RCA and Duct Sealing programs involves Verification Service Providers (VSPs). These VSPs use proprietary "expert" systems to record initial operating conditions and recommend improvements to reach a desired end state. Prior to further use, these systems will be evaluated to determine whether they are reliable and repeatable; whether a sustainable contractor business model can be built around their use; and whether their use supports the Strategic Plan HVAC goals.

As outlined above, there are a number of issues needing resolution through concerted effort during the first year of sub-program funding. These all fit under the general rubric of quantifying potential savings. Resolution is required on the mix of maintenance measures and conditions of their applicability, reasonable expectations on the rate at which repair opportunities will surface in lieu of new installations, the reliability of two major measures (Duct Sealing and Refrigerant Charge), the expected savings from a range of specific HVAC servicing measures, and the validity/reliability of some test methods. The coming availability of HERS II (for residential systems), interacting with ASHRAE, ACCA, and NCI specifications, along with issues respecting the VSP diagnostic methods, also require resolution through an accelerated first-year inquiry involving a variety of stakeholders and a combination of document review, meta-analysis and perhaps on-site experimentation that compares various diagnostic methods.

The program will address the following barriers:

- Lack of awareness: By quantifying the energy efficiency benefits of QM, the benefits of QM will be better understood by program participants. It is our goal to discover the evidence, and expected return on investment, that customers will require to authorize payment for these measures (and any premium measures that outperform QI/QM ANSI standards) when subsidies are removed.
- Performance uncertainties: Much research has been conducted on the energy savings achievable through HVAC system maintenance measures such as RCA and Duct Sealing, but many performance uncertainties still exist. One of the first

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tasks conducted by the program will be to conduct a comprehensive research study vetted by the HVAC industry to quantify the real energy savings that consumers can expect to achieve through ongoing maintenance of their system. This study will also include the appropriate level of behavioral studies to learn why customers do not currently value maintenance and what factors are needed to motivate consumers to act. This level of study is required to quantify the cost/benefit for delivering and receiving QM services.

- **Asymmetric Information:** Delivering QM training opportunities through existing industry channels (e.g., distributors, trade associations, etc.) will provide a higher level of credibility for QM training than offering exclusively through IOUs will.
- **Bounded rationality:** It is logical to assume that the HVAC industry would want to deliver quality service; however, market dynamics have not supported such logic, as the industry has largely become commoditized and low price/low quality typically wins out. The HVAC QM Program will conduct the necessary behavioral research to understand the dynamics that will help influence the necessary changes, so that the marketplace will value and purchase higher-quality services.
- **Hidden costs:** By promoting the concepts and value of QM at the time of system installation, customers will be assured that the energy efficiency benefits of new systems will continue throughout the life of each system.
- **Organizational customs:** The HVAC industry has largely become commoditized into an industry driven by low costs and quality, where quality is assumed, but not understood or valued, by the customer. This results, in part, from contractors having minimal success in communicating the value of QM to consumers and consumers not understanding the linkages between comfort and energy use. The HVAC QM Program will demonstrate the value of a high-quality contracting business and educating consumers on the energy benefits of QI/QM.

d) Quantitative Program Targets

The targets provided herein are best estimates, but nonetheless are forecasts.

Table 5

Program Name	Program Target by 2009	Program Target by 2010	Program Target by 2011
Residential Systems	TBD	TBD	TBD
Commercial Systems	TBD	TBD	TBD

e) Advancing Strategic Plan goals and objectives

The program will help to achieve the following near-term strategic goals, as identified in Chapter 6 of the Strategic Plan:

2-1: Create a Statewide QI/QM Brand

Leveraging the ENERGY STAR® brand equity (ENERGY STAR® Quality HVAC Installation Program, ENERGY STAR® Service & Product Provider Program, and

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ENERGY STAR® for Small Business & Congregations) is a cost-effective approach to introducing an immediate QI/QM brand. In order to help residential and commercial consumers more clearly recognize contractors and technicians who can truly deliver QI/QM, the IOUs will also aggressively help the HVAC industry to more firmly establish the higher value/consumer benefit of its own widely accepted industry credentials. Examples of consensus HVAC credentials are the Industry Competency Exam (ICE), technician certification by North American Technician Excellence (NATE), a variety of union “Journeyman” designations, TABB, NEBB, AABC, NBC and STAR certifications, etc. In addition, the IOUs will provide financial resources to organizations (e.g., ACCA and SMACNA) to make existing and newly developed ANSI QI/QM standards available to the California contractor and technician community at no cost. Additional efforts will be dedicated to evaluating whether a California-specific brand is viable.

2-2: Launch Statewide Brand

IOU sponsored co-branding efforts will be developed based on the branding activity and made available to contractors for promotion of the QI/QM effort. The IOUs will communicate information about the QI/QM branding effort to contractors, technicians, and other HVAC industry stakeholders by putting inserts in trade journals like Indoor Comfort News, The ACHR News, and Contracting Business, by purchasing ad space in association e-letters and on California chapter association websites, and by purchasing a series of professionally produced webinars and/or infomercials from the above news organizations.

2-3: Provide expanded QI/QM training

Before launching the consumer side of the QI/QM Program, HVAC service technicians will be fully trained in the delivery of the measures promoted by the program. Furthermore, feedback mechanisms will be used to continually evaluate technician performance, to ensure that technicians are applying the information taught in QI/QM training. Nearly all economists and government leaders agree that negative impacts of the current worldwide financial crisis are likely to linger for years. Thus, the IOUs will work closely with the industry to reduce (and wherever possible eliminate) the direct costs of this transformative training to technicians and contractors who are willing and able to apply their skills and new tools to the task at hand.

2-4: Implement contractor accreditation program

Efforts will be made to promote NATE certification (e.g., by providing additional contractor incentives that reimburse participating contractors for testing costs).

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4-5: Develop standards for on-board diagnostic functionality

Evaluating the use of hand-held and other types of diagnostic systems in the field will help determine viable protocols for both commercial and residential applications.

4-6: Prioritize in-field diagnostic approaches

Conducting the appropriate level of research into existing diagnostic and verification approaches will provide the IOUs and the HVAC industry with the information necessary to target future efforts based on quantifiable energy efficiency benefits.

6. Program Implementation

a) Statewide IOU Coordination

All California IOUs will jointly lead industry efforts to design and implement a viable commercial and residential QM program. Specific areas of coordination include:

i. Program name: Residential Quality Maintenance and Commercial Quality Maintenance Development

ii. Program delivery mechanisms

The IOUs will design the program under the auspices of the HVAC Industry Leadership Task Force as described in the core Residential and Commercial HVAC PIP, above. Management of the actual delivery aspects will depend on the eventual program design, but would likely include a combination of third-party programs and internal administrative staff, and will follow the adaptive management process discussed in the core Residential and Commercial HVAC Program PIP. The program will be targeted to consumers and contractors to create a push/pull dynamic that influences sustained market changes.

iii. Incentive levels

See Section 4.b., above.

iv. Marketing and outreach plans

Program marketing cannot fully be determined until the program design is complete. However, it is expected that common outreach materials will be developed by the IOUs in partnership with industry associations such as ACCA, ASHRAE, AHRI, SMACNA, MCAA, PHCC, RSES, HARDI, IHACI, ACTA, SMWIA, UA, IUOE, and others who demonstrate interest. These materials will only be available to participating contractors and will allow for co-branding with the contractor name. Additional point-of-sale information on QM will be made available for equipment dealer locations and building departments (where residential customers may be receptive to “neutral” public service messages).

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v. IOU program interactions

One of the strategies outlined in the Strategic Plan's HVAC chapter⁴⁹ is to create a better linkage between CEC Title 24 compliance efforts and IOU energy efficiency programs. Previous efforts have been managed with different yet consistent purposes. In order to achieve the market transformation goals of the Strategic Plan, the IOUs will support CEC and CPUC efforts to develop one common effort.

vi. Similar IOU and POU programs

As a result of increased federal equipment efficiency standards, many utilities across the country have begun to offer service-based programs that independently offer measures such as RCA and Duct Sealing. It is expected that the HVAC QM Program could stimulate a paradigm shift by delivering a comprehensive suite of maintenance services, that comply with or exceed ANSI standards for premium maintenance, designed to address the full range of efficiency measures available for commercial and residential HVAC systems.

b) Program delivery and coordination

The program will be coordinated with the following activities:

i. Emerging Technologies program

The HVAC QM Program is expected to interact extensively with the Emerging Technologies Program to ensure the proper focus on remote and on-board diagnostic equipment. Coordination activities will be realized through the Joint Program Management Team as described in the core Residential and Commercial HVAC Program PIP, above.

ii. Codes and Standards program

This service-based program is neither affected nor regulated by building codes. However, recognizing that the HERS Phase II regulation which will become effective in the third quarter of 2009 is a valid delivery mechanism for this Program, closer linkages will be made with Codes and Standards staff and their work with the CEC. Coordination activities will be realized through the Joint Program Management Team as described in the core Residential and Commercial HVAC Program PIP, above.

iii. WE&T efforts

Participating contractors will be required to attend program-specific QM training in order to participate in the program.⁵⁰

iv. Program-specific marketing and outreach efforts

Co-branded marketing support for participating contractors will be necessary to advance Statewide QM efforts. Such support will include exclusive promotion on

⁴⁹ Strategic Plan, §6.4 and §6.5.

⁵⁰ See the HVAC WE&T sub-program PIP, below, for more information.

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IOU websites, brochures, and other leave-behind materials that contractors can use to promote QM and their involvement with the program. Additional general promotional materials such as point-of-sale displays for equipment dealers will also be developed.⁵¹

v. Non-energy activities of program

The direct energy benefits of the program result from the quality maintenance of HVAC systems. Other activities will be required to support these energy savings goals, including significant efforts in program design, systems development, contractor training and consumer marketing.

vi. Non-IOU programs

The program will interact with the HVAC industry to develop and introduce increasingly stronger QM standards that ensure systems are operating in their most efficient state.

vii. CEC work on PIER

The program will interact extensively with the Emerging Technologies Program to ensure the proper focus on remote and on-board diagnostic equipment. Such efforts are already underway with the PIER program. This activity will primarily be managed under the Technology and System Diagnostics Advocacy sub-program.

viii. CEC work on Codes and Standards

See Section 6.b.ii., above.

ix. Non-utility market initiatives

The tenets of QM are being actively pursued by the HVAC industry itself. ACCA has taken the lead in this national effort by developing various ANSI recognized QM standards. These standards have been widely adopted throughout the industry (e.g., AHRI, ASHRAE, CEE, ENERGY STAR®, utilities, etc.). Other organizations have also developed processes designed to improve the operating efficiency of HVAC systems (e.g., NCI). The IOUs will remain engaged in these efforts and work to influence the development of increasingly higher standards.

c) Best Practices

The IOUs have been managing RCA and Duct Sealing programs for several years and have seen that the results they deliver are uncertain at best. This program seeks to create a new standard for HVAC service-based programs by developing a more comprehensive approach that delivers reliable energy savings. This program will be developed with full industry involvement to ensure that:

- It is accepted by the industry, which will help it meet its market transformation objectives, since current RCA and Duct Sealing programs are delivered by a small

⁵¹ Specific IOU budget information for this marketing activity is provided in Table 1, above.

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fraction of the more than 16,000 licensed contractors and have not proven sustainable without utility incentives.

- It effectively trains service technicians to provide QM services.
- It provides the necessary quality control processes to ensure that the appropriate service measures are performed.
- It delivers reliable energy savings.
- It demonstrates a clear value proposition for contractors and customers.

d) Innovation

The innovation of this program exists through the adoption of a comprehensive maintenance approach based on industry-accepted standards. Traditional utility programs have delivered individual service measures such as RCA and Duct Sealing. The delivery of these measures has proven questionable in terms of their energy savings. A more comprehensive maintenance effort that delivers well-documented energy savings will set the standard for HVAC efficiency programs. Furthermore, delivering this program through active partnership with the industry will increase the likelihood of its success. Finally, innovation results through a continuous improvement process that will be employed to evaluate the viability of offering additional incentives for installations that exceed established program standards (e.g., TABB, NEBB, NCI, etc.).

e) Integrated/coordinated Demand Side Management

As with most HVAC oriented programs, the primary source of integration exists between energy efficiency and DR activities. At a minimum, all marketing materials developed to support QM will cross-promote DR to educate customers on the availability of IOU DR programs. The required contractor training will be designed to include a discussion on DR programs, and participating contractors will be required to deliver DR information as part of their customer sales efforts. Finally, contractors will be encouraged to facilitate customer participation in DR programs by providing a completed DR program application to the system owner at the completion of the maintenance service. Additional work will take place during the 2009-2011 program cycle to evaluate closer linkages between EE and DR.

f) Integration across resource types (energy, water, air quality, etc)

The program can be designed to support CARB's efforts to regulate GHGs by providing consumer information on the phase-out of existing refrigerants and the move to zero-ODP refrigerants with the customer's maintenance invoice. Such information will seek to influence the customer's adoption of newer equipment by explaining the likelihood of increased maintenance costs as existing refrigerants become less available.

g) Pilots

As with any good product/program design, pilots are needed to test the concept before full-scale launch. The HVAC QM program will use pilots to test the implementation of program concepts, processes, and the integration of ever-increasing QM standards.

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h) EM&V

To support the continuous improvement envisioned by the adaptive management process, and to fully address the intricacies of the program design, continuous EM&V will be established to provide timely feedback on the effectiveness of program implementation tactics. Also, a longer-term verification element aimed at substantiating persistence of QM measures will be developed and implemented. At minimum, performance measurements on an appropriate number of units served by the QM program will be evaluated over a minimum 5-year period at intervals of approximately 1 year, 3 years, and 5 years. This will require pre-service monitoring on an appropriate number of units. The specific number of units and the measurement and reporting interval will be determined in collaboration with the CPUC, the Industry Leadership Task Force, and the IOU Program Management Team.

Detailed plans for process evaluations and other evaluation efforts specific to this program will be developed after the final program design is approved by the CPUC and program implementation has begun, since final plans will be based on identified program design and implementation issues and questions. However, a brief description of the current, preliminary plans is provided here.

Early EM&V (in 2009) will entail a concerted effort, integrated with and directed by the HVAC Industry Leadership Task Force and the IOU Joint Program Management Team, to develop a common set of measures that are approved for program inclusion, a common set of diagnostic and measurement approaches (or a clear understanding informing the acceptance of differing approaches), and any correctives to ex-ante savings assumptions that can be empirically supported and agreed upon based on meta-analysis. This work will serve as input to not only the measures agreed upon, but the initial designations of incentives to these measures.

This process should allow:

- A clear set of baseline and progress indicators to be developed during 2009; and
- Transition to other evaluation concerns, which should be responded to with a combination of quantitative and qualitative, feedback-oriented process evaluation. This will entail ongoing collection and monitoring of data reflecting the baseline and progress indicators identified in 2009.

These can be made part of a more general process evaluation effort which can and should be used to provide qualitative and quantitative feedback to the program, as well as establishing key estimates that will be needed in support of impact evaluations and further planning.

Although the studies considered here are not impact evaluations, it will be appropriate to obtain ongoing information on the importance of the incentive, at given levels, in affecting contractor and customer decisions to perform appropriate service and

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maintenance measures. This work, which might be carried out with a short battery of survey items, or a joint-oriented survey, may help to correct the program in terms of the incentive amount actually necessary to effectively recruit customers when combined with other benefits communicated to them through the contractor and other marketing mechanisms.

As is true for the entire Residential and Commercial HVAC Program, a great deal of organizational and inter-organizational activity is planned, under the general rubric of “adaptive management.” With IOUs and third-party organizations managing and implementing this program, other involved or potentially involved organizations include a proposed HVAC Industry Leadership Task Force, a Joint IOU Program Management Team primarily composed of IOU program managers, CEC, Government Partnership Program and Codes and Standards staff, and utility and regulatory stakeholders. The relationships (or potential relationships) have promise for fruitful integration, and a qualitative process evaluation approach documenting the reasons that relationships are working or not working will be useful in optimizing the emergent structure

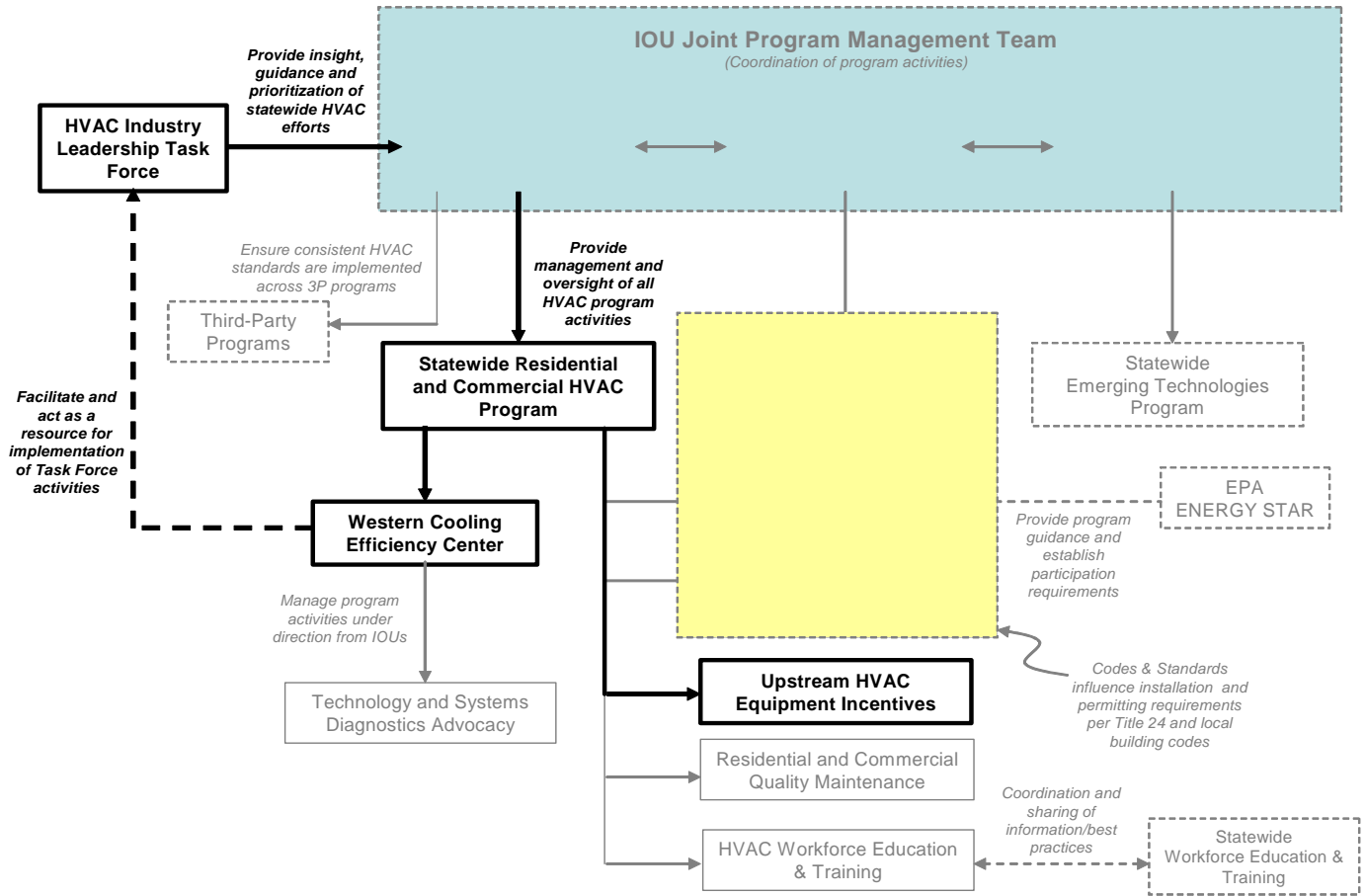
In addition to the above research and evaluation issues, certain key outcomes or relationships relevant to program theory are implied by the program plan, and deserve mention as researchable topics:

- The effectiveness of the first-year process in which stakeholders and researchers consolidate a set of measures, diagnostic techniques, agreed-upon measure applicability guidelines, and possibly savings estimates. Also, what in-stream changes will be necessary with respect to the relationship between the M&E entity or entities performing the meta-analysis, and the various stakeholder/advisory groups?
- Issues relating to co-branding, including process issues as well as actual relevance of the brand to contractor or customer behavior.
- The effectiveness of expanding QI/QM training, the extent to which incentives are effective in expanding participation, and the degree to which this connects with the appropriate delivery of quality measures.
- The effectiveness of market materials in creating “pull” among potential maintenance service recipients.
- The effectiveness of the program in routing customers to other programs, particularly non-residential DR, and the reverse.

Finally, although not intended to serve as a substitute for impact evaluation, inexpensive billing analysis approaches may be carried out, in order to frame the range of reasonable expectations from quality service and repairs in specific residential or non-residential circumstances. This preliminary work can easily be undertaken on an ongoing basis by IOU staff or consultants.

HVAC: Residential Quality Maintenance and Commercial Quality Maintenance Development

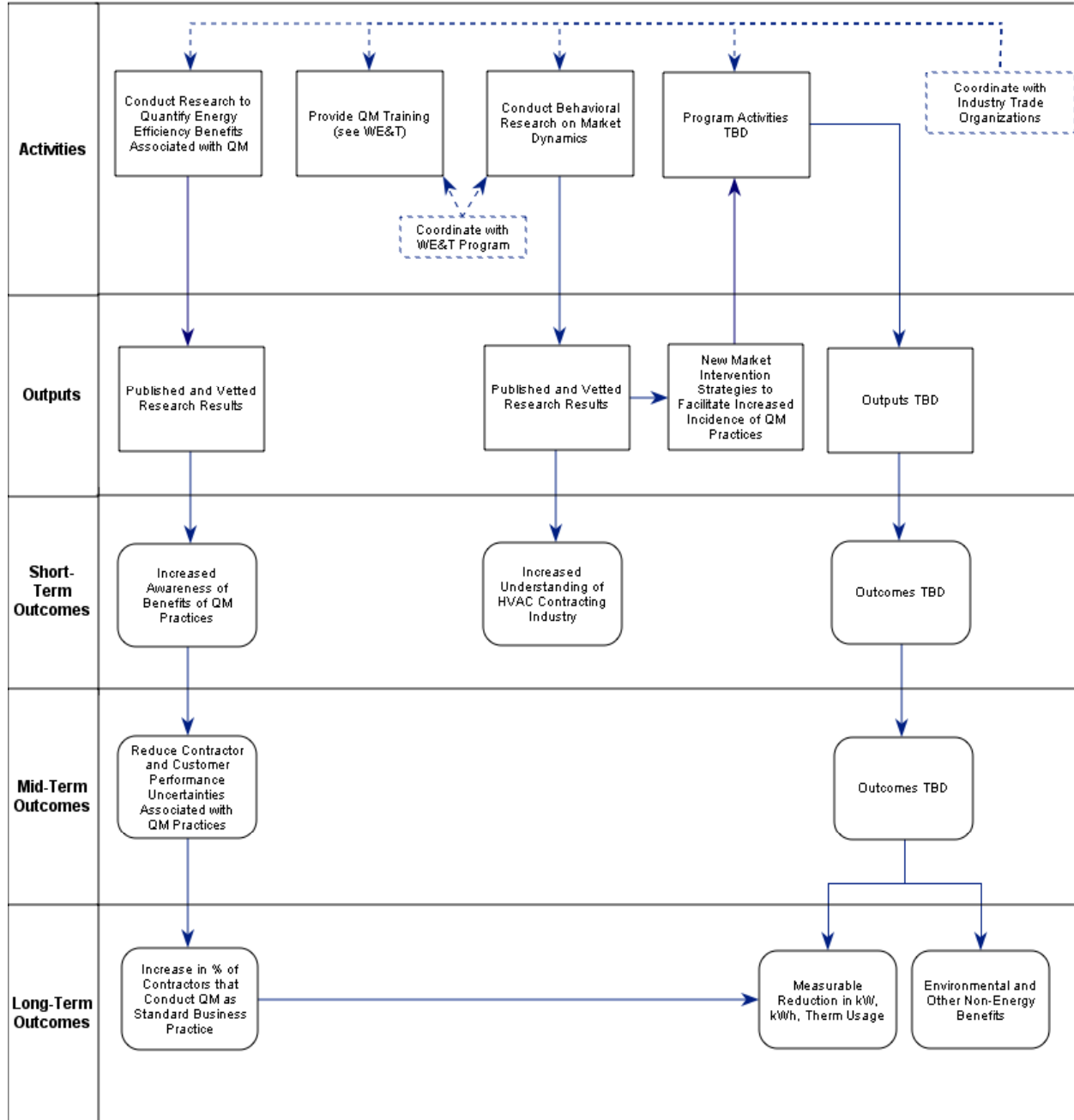
7. Diagram of Program



HVAC: Residential Quality Maintenance and Commercial Quality Maintenance Development

8. Program Logic Model

Program: Residential & Commercial HVAC Program
 Sub Program: Residential and Commercial Quality Maintenance Program



7f

HVAC: HVAC Workforce Education & Training

- 1. Program Name:** HVAC Workforce Education & Training (HVAC WE&T)
Program Type: Core

- 2. Projected Program Budget Table**

Table 1 - reference the core program for budget details

- 3. Projected Program Gross Impacts Table – by calendar year**

Table 2 - reference the core program for projected gross impact details

- 4. Program Description**

- a) Describe program**

This sub-program will deliver a dedicated, industry-specific effort that offers education and training opportunities targeted at all levels of the HVAC value chain. Prior to starting such an activity, and as outlined in the Strategic Plan, the sub-program will conduct a comprehensive training-needs assessment⁵² to determine industry skill gaps, identify opportunities for collaboration with existing HVAC education and training infrastructure, and implement recommendations needed to close gaps at all levels of the industry.

- b) List measures**

This sub-program is a non-resource program that does not offer direct customer incentives.

- c) List non-incentive customer services**

This sub-program is a non-resource program activity that will deliver a consistent QI/QM-focused training effort designed to:

- Introduce the HVAC trade to the Strategic Plan and their role in its implementation; and
- Draw attention to the dominance of sub-standard installation and maintenance in California.

Further distinctions will be made between sub-standard, standard, and premium work, in order to persuade quality-inclined contractors, installers, and technicians to embrace the quality standards as the minimum level of service they will provide to their customers, and, over time, and to propose and deliver premium levels of service to their customers at every opportunity.

The following industry participants will be targeted through this effort, in a manner consistent with the Strategic Plan. The sub-program will:

- Contractor/Owner: Address proper QI/QM methods (system sizing, installation, air distribution and owner documentation), as well as the needs of the business

⁵² SCE has already begun development of such a needs assessment for its own service territory and its effort can be easily expanded into a California effort.

HVAC: HVAC Workforce Education & Training

- owner, by clearly communicating the value proposition of managing their operations with a quality and energy efficiency focus, and how important their efforts are to the Strategic Plan. The sub-program will also concentrate on promoting quality as a high-margin, value-added service that can benefit the contractor through fewer callbacks and increased customer satisfaction.
- Technician: Address proper QI/QM methods by supporting and collaborating with training opportunities available through industry associations, labor unions, and online educators. This strategy may include state and/or national certification programs.
 - Apprentice/Installer: Offer training for new technicians entering the industry by developing and supporting consistent QI certification programs offered through existing trade associations, trade unions, and national training organizations.
 - Salespeople (and others also responsible for business development): Work with existing HVAC industry sales and marketing experts to develop and add new modules to their own already credible and trusted training, in order to help California contractors better articulate and promote the benefits of higher levels of service to their prospects and existing clients. These new modules will be focused on energy-efficient replacements, Energy Star® QI, QM (as defined in the appropriate industry standards), fault detection and diagnostics-aided (FDD-aided) system tune-ups, energy efficiency alert, and “premium” maintenance. Because the sales cycles and processes for residential and commercial customers differ significantly, separate sales and marketing curricula and methodologies will be developed for each segment.
 - Students: Partner with HVAC educators and the industry to address technician shortages by promoting a viable career path, and partner with colleges and technical schools to offer the QI/QM and energy efficiency training required to provide the industry with a qualified labor pool.
 - Building Officials: The program will actively work with the Statewide Codes and Standards program to support and develop meaningful strategies that provide QI and energy efficiency training for code officials and/or third-party inspectors and provide consistent interpretation and implementation of Title 24 during the inspection process.⁵³

5. Program Rationale and Expected Outcome

a) Quantitative Baseline and Market Transformation Information

By its nature, market transformation occurs as a result of numerous factors and programs, not single sub-programs. Therefore, all metrics are proposed at the program level. Please refer to the quantitative baseline and market transformation discussion, presented in the overall program PIP.

Table 3 – Refer to the overarching program for quantitative baseline metrics

⁵³ See Section 6 of the Codes and Standards PIP for a specific discussion on activities related to improving HVAC code compliance.

HVAC: HVAC Workforce Education & Training

b) Market Transformation Information

By its nature, market transformation occurs as a result of numerous factors and programs, not single sub-programs. Therefore, all metrics and goals are proposed at the program level. Please refer to the quantitative baseline and market transformation discussion, presented in the overall program PIP.

Table 4 – Refer to the overarching program for market transformation metrics

c) Program Design to Overcome Barriers

The program will address the following barriers:

- Inconvenience costs/lack of awareness: By creating a targeted Statewide web-based training clearinghouse, the program will give HVAC technicians a single source for current information that will identify all relevant training resources available to them.⁵⁴
- Performance uncertainties: It is difficult for contractors to quantify the cost/benefit for attending training courses, since the market has yet to demonstrate either any tangible value in being trained in the use of state-of-the-art tools, new diagnostics protocols, methodologies, and condition-based maintenance, or a willingness of residential and commercial customers to pay the full actual cost of QI/QM. However, linking well-trained contractors with IOU incentive programs will provide the opportunity for contractors to gain market share and/or other financial benefits by being actively promoted by IOUs.⁵⁵
- Asymmetric Information: Developing and delivering effective QI/QM training through and in partnership with existing industry channels (e.g., distributor locations, trade associations, labor unions, online educators, conferences, etc.) will provide a higher level of credibility for QI/QM training.
- Bounded rationality: It is reasonable to assume that the HVAC workforce would enthusiastically embrace training opportunities that would help them excel at their profession; however, market dynamics have not supported such logic because the industry has largely become commoditized. The HVAC WE&T program will conduct the necessary behavioral research to understand the dynamics that will help influence the necessary changes to move the industry beyond its low price-driven mentality and demonstrate the need for technicians to take an active role in their ongoing professional development.

d) Quantitative Program Targets

The targets provided herein are best estimates, but nonetheless are forecasts.

Table 5

Program Name	Program Target by 2009	Program Target by 2010	Program Target by 2011

⁵⁴ This targeted clearinghouse concept will ultimately need to be merged into the web portal that is being proposed by the Statewide WE&T Program. For more information, see the Statewide Workforce Education & Training Strategies PIP.

⁵⁵ For more information, see the ENERGY STAR® Residential QI PIP.

HVAC: HVAC Workforce Education & Training

HVAC Industry Personnel Trained	5,000	5,500	6,000
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e) Advancing Strategic Plan goals and objectives

The program will help to achieve the following near-term strategic goals, as identified in Chapter 6 of the Strategic Plan:

2-3: Provide expanded QI/QM training

A significant Statewide effort will be used to increase the availability of QI/QM training resources by working collaboratively with the entire HVAC industry, including manufacturers, distributors, contractors, labor unions, associations, educators and influential end-users. Specific tasks that will be accomplished include but are not limited to:

- Work with sheet metal and pipefitter union training centers to update and/or upgrade refrigeration cycle fault detection and diagnostics, economizer controls, and duct system/air balance courses so that they more closely align with QM and premium maintenance being promoted by the Statewide HVAC program.
- Work with the unions to promote member participation in upgraded classes.
- Work with California-based HVAC educators from community colleges, private schools, and online education providers to bring the AHRI-hosted HVACR & Plumbing Educators Workshop to California and use it to jump-start a California chapter of the Council of Air Conditioning and Refrigerating Educators (CARE).
- Work with RSES to add QI/QM and efficiency-focused modules to its online training offering.
- Assist RSES to promote participation in online training among California-based contractors and technicians.
- Work with online training and education providers, such as LearnHVAC.org (CEC and IOU-funded), HVACREducation.net, RSES eLearning, UA Interactive Online, Cengage Learning, Gatlin Education, and others, to update and/or upgrade courses as above, to add introduction to QI/QM standards to their curriculum, and to increase usage of these resources among California-based contractors and technicians.
- Work with HVAC industry sales and marketing consultants to develop and deliver QI/QM and premium maintenance sales training and coaching that will closely align with the Statewide HVAC program.

2-4: Implement contractor accreditation program

Additional benefits will be made available through the sub-program to support its efforts toward increasing the level of technician certification. Such efforts may include, but are not limited to, additional IOU promotion of contractors (e.g., “Gold Star Contractors”) who maintain a minimum percentage of NATE-certified technicians, reimbursement of testing costs, continuing education units (CEUs) for participating contractors, tying contractors to a Statewide brand for quality and efficiency, etc. Also, providing financial support to start a California-based NATE office for the purpose of significantly expanding NATE’s penetration throughout the

HVAC: HVAC Workforce Education & Training

state is an efficient and effective way California IOUs can collaborate to increase the percentage of certified technicians.

3-3: Accelerate whole-building educational opportunities

Create pathways for HVAC contractors to evolve into whole-building contractors by partnering with private and public community colleges and/or universities to develop the appropriate curriculum on whole building design practices. Such forward-thinking universities as Chapman University (located in Orange, California) will be engaged in the process.

6. Program Implementation

a) Statewide IOU Coordination

All California IOUs will offer the HVAC WE&T Program in a consistent manner. Specific areas of coordination include:

i. Program name: HVAC Workforce Education & Training Program (HVAC WE&T).

ii. Program delivery mechanisms

The IOUs will manage the program through a combination of third-party programs and internal administrative staff and will follow the adaptive management process discussed in the core Residential and Commercial HVAC Program. The program will be targeted to entry-level and journeyman technicians, contractor sales and service managers, business owners, and building officials, and will leverage existing industry delivery channels (such as manufacturers, distributors, contractors, labor unions, associations, and educators) rather than creating new ones, in order to provide training in a cost-effective manner.

iii. Incentive levels

N/A (no incentives will be offered through this sub-program).

iv. Marketing and outreach plans

The training offerings available through this program will be promoted using existing industry channels, such as the trade press (more than 30 with distribution in the state, e.g., Indoor Comfort News, The ACHR News, Contracting Business, Contractor, HVACRBUSINESS, etc.), trade associations (approximately 15 with membership in California, e.g., ACCA, IHACI, HARDI, SMACNA, RSES, MCAA, ACTA, etc.), HVAC schools (approximately 60 Statewide including Brownson Technical School, Mt. San Antonio College, El Camino College, Laney College, etc.), distributor locations (approximately 700 individual locations in California), maintenance/facility management brokers (approximately 15 companies dedicated to servicing HVAC systems for multi-site commercial customers in California, including Engineering Excellence, Nest International, CB Richard Ellis, Xencom Facility Management, etc.), contractor alliances, networks

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and franchises (at least 12 operating in California, including National Comfort Institute, Service Roundtable, Unified Group, LINC Service, etc.)

v. IOU program interactions

In order to support the need for increased code compliance, the program will cooperate with CEC training and enforcement activities targeted at local building departments. Such activities will also be used to promote the economic and performance benefits of QI/QM.

vi. Similar IOU and POU programs

Delivering IOU-sponsored HVAC training through existing industry channels represents a break from the norm for IOU training activities. The California IOUs are unaware of such an approach being used elsewhere and propose to initiate a Statewide IOU/POU coordinating group — perhaps under the auspices of CEE or some other umbrella organization — to discuss and implement HVAC program best practices that advance the strategic goals of the Strategic Plan throughout California.

b) Program delivery and coordination

The program will be coordinated with the following activities:

i. Emerging Technologies program

This program is planned to be responsive to new and emerging technologies by developing training modules specific to these technologies (e.g., for designing and specifying hot/dry equipment). New technologies will be integrated into the HVAC WE&T program as they become available to the market. Coordination of such training activities will be realized through the Joint Program Management Team, as described in the core Residential and Commercial HVAC PIP, above.

ii. Codes and Standards program

Efforts will be coordinated to ensure that a consistent message is delivered regarding code compliance and QI/QM. The Codes and Standards Program will take the lead on all code-based training and compliance items. Additionally, coordination activities will be realized through the Joint Program Management Team, as described in the core Residential and Commercial HVAC PIP, above.⁵⁶

iii. WE&T efforts

The HVAC WE&T Program will take the lead on all workforce training needs for the HVAC industry. This will provide the dedicated approach needed to achieve the goals outlined by the Strategic Plan. All activities will be coordinated with the Statewide WE&T program to ensure that there is no duplication of effort and that all efforts are integrated into the WE&T web portal that is being spearheaded by the Statewide IOU WE&T Program.⁵⁷

⁵⁶ For additional information about the Codes and Standards HVAC activities, see Section 6 of the Codes and Standards PIP.

⁵⁷ For more information, see the Statewide Workforce Education & Training Strategies PIP.

iv. Program-specific marketing and outreach efforts

Financial support will be provided to jump-start a California-based NATE office for the purpose of significantly expanding NATE's penetration throughout the state. A direct investment in NATE is one of the most effective ways California IOUs can collaborate on the quality-focused sectors of the HVAC industry as envisioned by the Strategic Plan. Financial support will also be provided to AHRI to host the HVACR and Plumbing Educators workshop in California, in order to increase the relative importance of HVAC education in California.⁵⁸

v. Non-energy activities of program

N/A (this program is a non-resource effort and all activities described herein are non-energy activities).

vi. Non-IOU programs

The IOUs will work closely with the efforts of the California chapter of SkillsU.S.A, which is a partnership of students, teachers, and industry representatives. A national nonprofit organization, it serves teachers and high school and college students who are preparing for careers in trade, technical, and skilled service occupations.

vii. CEC work on PIER

See Section 6.b.ii., above.

viii. CEC work on Codes and Standards

In a similar manner as with the coordination with the Codes and Standards program, the HVAC WE&T program will work in cooperation with CEC training and compliance efforts targeted at local building departments. The Codes and Standards program will take the lead on this effort. Additionally, coordination activities will be realized through the Joint Program Management Team, as described in the core Residential and Commercial HVAC Program.⁵⁹

ix. Non-utility market initiatives

The IOUs will continue to persuade industry leaders to mobilize their various constituencies to actively and enthusiastically support the Strategic Plan and the Statewide HVAC program. Collaborating with HVAC industry leaders and innovators to formulate, pilot, and ultimately prove the value of new, profitable, and persistent business models focused on QI, QM and energy efficiency will be essential to ensure the success of the Strategic Plan.

c) Best Practices

Tapping existing HVAC industry infrastructure for education, training, marketing, and sales expertise will ensure that the industry's collective best practices are

⁵⁸ Specific IOU budget information for such marketing activities is provided in Table 1, above.

⁵⁹ For additional information about the Codes and Standards HVAC activities, see Section 6 of the Codes and Standards PIP.

HVAC: HVAC Workforce Education & Training

integrated into California's HVAC training effort. Best practices learned through the many years that the IOUs have operated their Energy Centers will be disseminated more widely through the HVAC training community. If this approach proves successful, it can serve as the model for utility programs in other states.

d) Innovation

Innovative aspects of this program include building on the success of the IOU Energy Centers in delivering energy-related education and leveraging additional HVAC industry training channels to significantly increase the throughput of the HVAC workforce. Traditionally, IOUs have delivered training courses exclusively through their Energy Centers. These training outlets will still be needed and utilized, but using industry channels such as manufacturers, distributors, contractors, labor unions, associations, and educators (both classroom and online) will increase the penetration of a consistent QI/QM message in a cost-effective manner.

e) Integrated/coordinated Demand Side Management

As with most HVAC-oriented programs, the primary source of integration exists between energy efficiency and DR activities. Including a discussion of DR in all appropriate training materials will increase the HVAC industry's knowledge and awareness of DR technologies and ultimately increase their adoption, as contractors/technicians see the value of promoting DR as a normal course of business. Additional work will take place during the 2009-2011 program cycle to evaluate closer linkages between EE and DR.

f) Integration across resource types (energy, water, air quality, etc)

Training materials will be augmented to include the appropriate level of discussion that links HVAC with mandated GHG reductions. Additionally, water quality issues will be addressed in all training materials related to QI/QM of evaporative technologies.

g) Pilots

No pilot programs are planned as part of this effort.

h) EM&V

To support the continuous improvement envisioned by the adaptive management process and to fully address the intricacies of the program design, continuous EM&V will be established to provide timely feedback on the effectiveness of program implementation tactics. Detailed plans for process evaluations and other evaluation efforts specific to this program will be developed after the final program design is approved by the CPUC and program implementation has begun, since final plans will be based on identified program design and implementation issues and questions. However, a brief description of the current, preliminary plans is provided here.

In 2009, an industry-specific training needs assessment will be undertaken, in conjunction with the assessment method being developed by the Statewide Workforce Education & Training program. This is, first of all, an opportunity to develop an

HVAC: HVAC Workforce Education & Training

important baseline and progress indicator. A measurement and evaluation (M&E) contractor should assist in this expanded assessment approach. Issues include ensuring that the assessment results are reliable and are capable of identifying issues within “pockets” in the HVAC installation/service labor market (geographical, contractor size, job level, and technical specialties). The assessment should be sensitive to a number of knowledge areas including current standards, the variety of diagnostic and testing procedures, and newly emergent technologies and standards. The M&E contractor should be involved in ensuring that all relevant parts of the labor market are assessed.

In addition to planning “out-year” sample assessments in the HVAC labor force, M&E should work with program administrators to follow up on specific training sessions. Issues to be raised with samples of trainees (contractors, owners, and technicians) should include the effectiveness of the training, relevance to their work, whether the information will be used in future jobs, whether QI/QM “messages” are likely to be passed along accurately to customers, to what extent information specific to new technologies and diagnostic procedures has been transmitted, and whether or not the trainee regards the training as providing a competitive advantage in the marketplace – a prerequisite for ongoing success of the training program.

A number of recruitment strategies and pathways are considered in the plan, including the web portal, trade publications, HVAC schools, distributors, maintenance brokers, and perhaps the workforce supporting existing energy efficiency and DR programs. These paths will require somewhat different strategies. An assessment of the effectiveness of these pathways, and the ways in which the program should tailor its recruitment to them, will be useful M&E input on an ongoing, feedback basis.

Similarly, there are a number of existing organizational structures through which training will be implemented — manufacturers, distributors, contractors, labor unions, and educational institutions. The process evaluation will be helpful in identifying benefits, challenges, and necessary adaptations specific to these various structures and institutions.

In 2010, work will begin on assessment of the practical effectiveness of the program — for example, do accredited contractors feel that they have a sustained market advantage? Is there evidence, based on onsite sample surveys, that installations and servicing are significantly superior when accredited contractors perform the work?

There are discrete program steps involving, for example, establishment of a NATE office in California, establishment of training on the web portal, a series of workshops, establishment of program(s) in colleges, and joining with SkillsU.S.A. These are examples of accomplishments which can have significant multiplier effects upon the overall labor force, due to their pivotal structural location. In some cases, process evaluation will be useful in identifying the key organizational, inter-

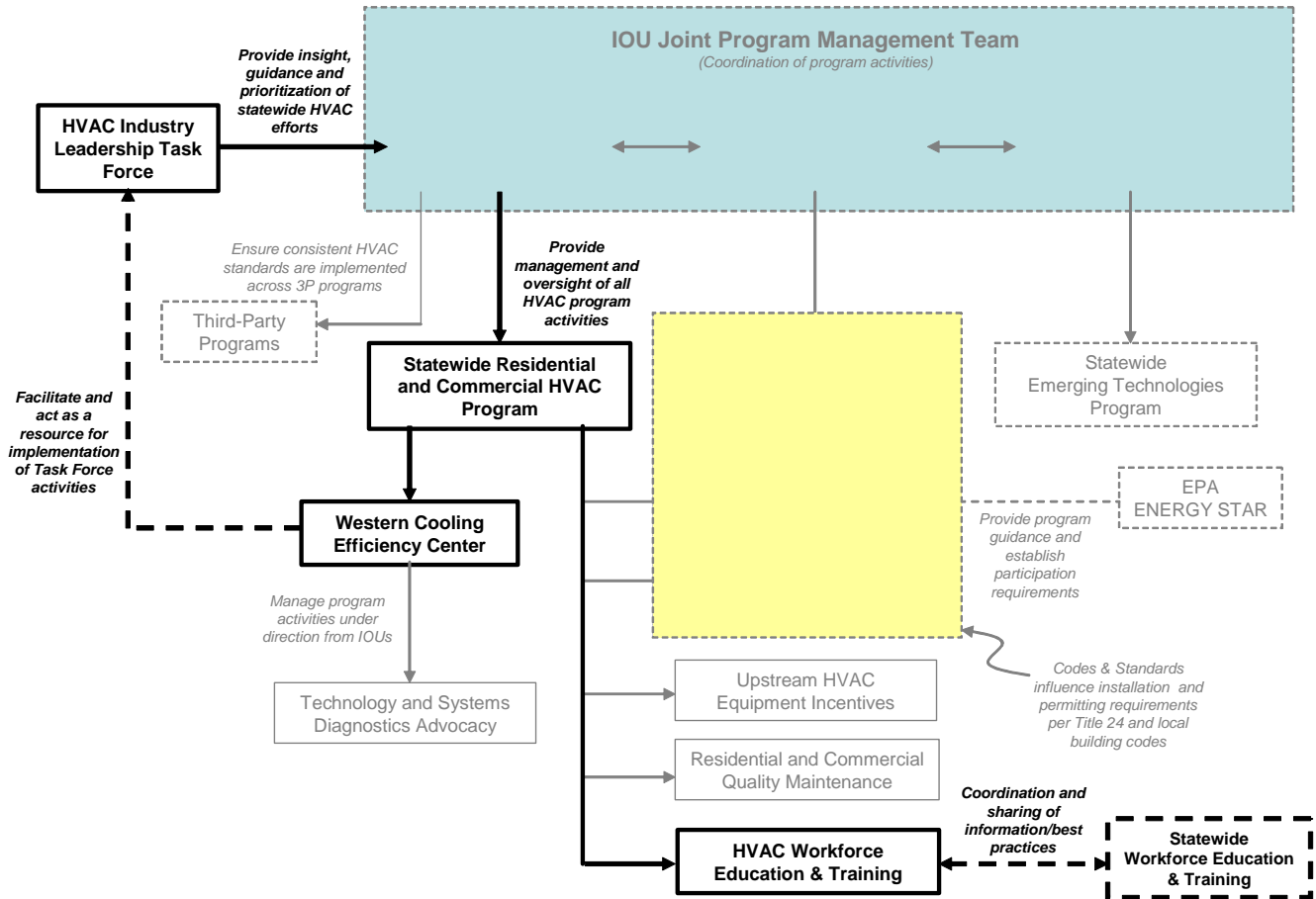
HVAC: HVAC Workforce Education & Training

organizational, or resource hurdles that determine whether these important steps are successfully realized.

Finally, this educational push is beginning as new federal influences may be expected to modify the energy efficiency terrain, specifically as related to job training. Process evaluation will assist in assessing and improvement of the program's adjustment to these changes.

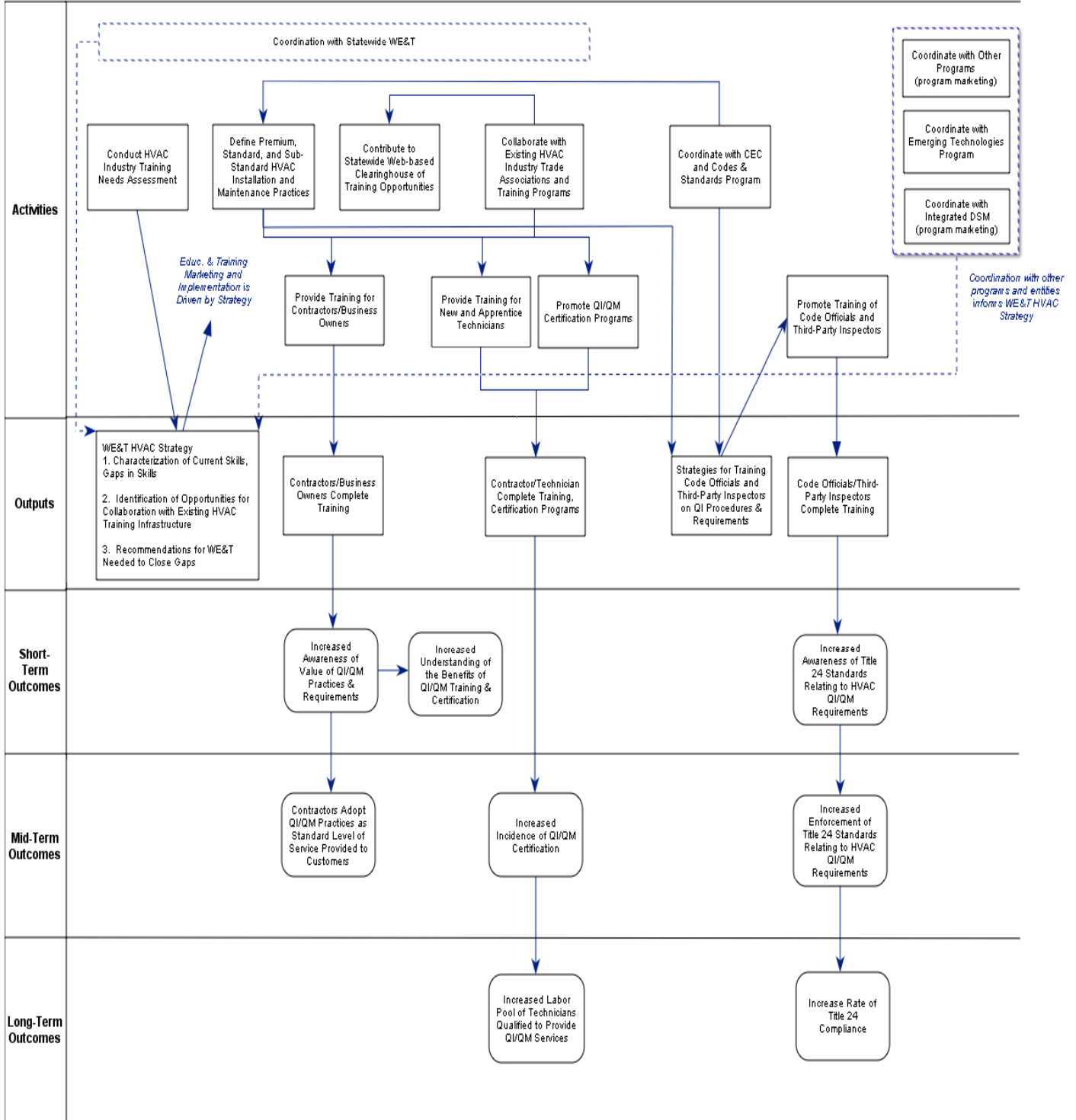
HVAC: HVAC Workforce Education & Training

7. Diagram of Program



8. Program Logic Model

Program: Residential and Commercial HVAC Program Sub Program: Workforce Education & Training (WE&T)



8

Codes and Standards

1. **Program Name:** Codes and Standards (C&S)
Program ID#: SCE-SW-008
Program Type: Statewide Core Program

2. Projected Program Budget Table

Table 1¹

Prog #	Main Program Name/Sub-Programs	Total Administrative Cost (Actual)	Total Marketing & Outreach (Actual)	Total Direct Implementation (Actual)	Integration Budget Allocated to other Programs (If Applicable)	Total Budget By Program (Actual)
Codes and Standards						
	Codes & Standards Program #1					
	C&S Program Overall	N/A	N/A	N/A	N/A	N/A
	Building Codes: Advocacy, Extension of Advocacy, and CASE studies	\$1,023,637	\$ -	\$4,848,363	N/A	\$ 5,872,000
	Appliance Standards: Advocacy, Extension of Advocacy, and CASE Studies	\$ 231,945	\$ -	\$1,098,055	N/A	\$ 1,330,000
	Compliance Enhancement Program: Measure-Based and Holistic	\$ 385,907	\$ -	\$1,830,093	N/A	\$ 2,216,000
	Reach Codes: Local Government Ordinances and Green Building Standards	\$ 289,431	\$ -	\$1,372,569	N/A	\$ 1,662,000
	Coordination (Statewide, EE Program and External Entities)	N/A	N/A	N/A	N/A	N/A
	Education and Training (not for improving compliance)	N/A	N/A	N/A	N/A	N/A
	Quality Assurance & Program Evaluation Activities	N/A	N/A	N/A	N/A	N/A
	Other					
	TOTAL:	\$1,930,920		\$9,149,080		\$11,080,000

¹ Definition of Table 1 Column Headings: Total Budget is the sum of all other columns presented here.

Total Administrative Cost includes all Managerial and Clerical Labor, Human Resource Support and Development, Travel and Conference Fees, and General and Administrative Overhead (labor and materials).

Total Direct Implementation – includes all financial incentives used to promote participation in a program and the cost of all direct labor, installation and service labor, hardware and materials, and rebate processing and inspection used to promote participation in a program.

Total Marketing & Outreach includes all media buy costs and labor associated with marketing production.

Integrated Budget Allocated to Other Programs includes budget utilized to coordinate with other EE, DR, or DG programs.

Total Budget is the sum of all other columns presented here

Definition of Sub-Program: A “sub-program” of a program has a specific title; targets; budget; uses a unique delivery or marketing approach not used across the entire program; and for resource programs, has specific estimated savings and demand impacts.

Codes and Standards

3. Projected Program Gross Impacts Table

Table 2

SCE-SW-008	SW Codes & Standards	2009-11 EE Program Gross kWh Savings	2009-11 EE Program Gross kW Savings	2009-11 EE Program Gross Therm Savings
	SW Codes & Standards	232,416,517	43,441	-
	TOTAL	232,416,517	43,441	-

Total Codes and Standards program impacts for SCE are 1,071 GWh of energy savings and 196 MW of demand reduction before reductions attributed to Normally Occurring Market Adoption and Attribution.

Table 2 includes savings from the following California Energy Commission (CEC) proceedings:

- 2003 Title 24 (Building regulations adopted in 2003 and effective in 2005. We have previously referred to these as 2005 Title-24);
- 2004 Title 20 (Appliance regulations adopted in 2004 and effective in 2006, 2007 or 2008. We have previously referred to these as 2005 Title 20);
- 2006 Title 20 Tier II Lighting (Adopted in 2006, became effective in 2008);
- 2008 Title 24 (Adopted in 2008, they will become effective in 2009);
- 2008 Title 20 (Adopted in 2008, they will become effective in 2010 or later; in particular, general service incandescent lamps for which federal legislation prescribes limits on California; and
- 2009 Title 20 (Assuming the CEC completes Phase II proceedings in 2009, effective dates are proposed for 2011 or later).

Table 2 savings are calculated from the sum of first-year gross savings from each CEC proceeding in 2009, 2010, and 2011. Gross savings are calculated from projected statewide installations, compliance, energy use baseline, and unit energy savings, prior to correcting for naturally occurring market adoption and attribution.

Savings in Table 2 are based on actual installation of measures, consistent with the rest of the portfolio that savings are real and in existence; therefore, 100% credit is assumed for savings from all proceedings, including those from pre-2006 adoptions.

4. Program Mission

The Codes and Standards 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 by working with local governments to develop ordinances that exceed statewide minimum requirements.

The Codes & Standards Program conducts advocacy activities to improve building and appliance efficiency regulations. The principal audience is the CEC, which conducts periodic rulemakings, usually on a three-year cycle (for building regulations), to update building and appliance energy efficiency regulations. Codes & Standards also seeks to influence the United States Department of Energy (DOE) in setting national energy policy that impacts California.

Codes and Standards

In some cases we may seek to influence the state legislature and other state agencies like the California Air Resources Board (CARB) to influence policy regarding buildings and appliances. We may explore ways to influence the US Congress outside the traditional means of negotiating through federal partners such as ACEEE or ASAP.

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.

The program participates in DOE proceedings and legislative negotiations leading to federal regulations that are passed through to California. In particular, Title 20 appliance efficiency regulations are the same as federal regulations.

Extension of advocacy activities, in particular, includes compliance improvement efforts carried out as continuing advocacy for codes or standards adopted as a result of the program. Following adoption, Codes & Standards supports compliance improvement with both Title 24 building codes and Title 20 appliance standards.

Compliance Enhancement (CE) sub-program activities – in that, these are not carried out as extension of advocacy – include two elements based on the CPUC’s Evaluator’s Protocol for Code Compliance Enhancement Programs: 1) the measure-based element is aimed at codes or standards not adopted as a result of the program, similar to extension of advocacy efforts, and 2) the holistic compliance enhancement sub-program seeks to improve building department energy code enforcement processes from beginning to end. Compliance improvement responds to the CPUC’s interest in robust implementation of existing standards and support for the Strategic Plan’s HVAC Big, Bold strategies.

The program carries out strategic activities that support or shape future codes and standards. In addition to mandatory minimum-level codes, the Codes & Standards Program advocates for the development and implementation of “reach codes” that exceed minimum state code requirements and may be adopted by local jurisdictions or agencies. The program monitors and/or participates in a wide range of activities or proceedings that have direct or indirect impacts on California regulations including, but not limited to, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE); international activities, including Europe, Asia, Canada, and Australia; voluntary standards such as green building codes, and ratings organizations such as the Cool Roof Rating Council (CRRC), National Fenestration Rating Council (NFRC), and the United States Green Building Council (USGBC).

A glossary of acronyms used in this document is provided at the end of the document.

Codes and Standards

5. Program Rationale & Expected Outcomes

a) Quantitative Baseline

Table 3

Codes and Standards Sub-program	Baseline Metric
Building Codes Advocacy	Previous regulation or market characterization, as appropriate <i>Initial compliance rates for EOA measures²:</i> 2003 Residential Hardwired Lighting: TBD 2003 Residential Duct Improvement: TBD 2003 Lighting Controls Under Skylights: TBD 2003 Ducts, New and Existing Commercial Buildings: TBD 2008 Indoor Lighting (skylighting, sidelighting, DR): TBD 2008 Residential Pools: TBD 2008 Cool Roofs: TBD 2008 Envelope Insulation: TBD 2008 Refrigerated Warehouses: TBD 2008 Outdoor Lighting: TBD 2008 Acceptance Testing: TBD 2008 Residential Water Heating Distribution System: TBD
Appliance Standards Advocacy	Previous regulation or market characterization, as appropriate <i>Initial compliance rates for EOA measures:</i> 2004 General Service Incandescent Lamps, Tier 1: TBD 2004 General Service Incandescent Lamps, Tier 2: TBD 2004 Residential Pool Pumps, High Efficiency Motors, Tier 1: TBD 2004 Residential Pool Pumps, 2-speed Motors, Tier 2: TBD 2004 Pulse Start Metal Halide HID Luminaires, Tier 1: TBD 2004 Pulse Start Metal Halide HID Luminaires, Tier 2: TBD 2004 Consumer Electronics - Audio Players: TBD 2004 Consumer Electronics – TVs: TBD 2004 Consumer Electronics – DVDs: TBD 2004 Unit Heaters and Duct Furnaces: TBD 2008 and 2009 measures: TBD

² The current Cadmus Group studies will determine compliance rates for 2003 and 2004 measures. The IOUs expect future Cadmus Group studies to provide compliance rates for 2006, 2008 and 2009 measures.

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Codes and Standards Sub-program	Baseline Metric
Compliance Enhancement	<p>The pre-program compliance baseline for the measure-based CE element will be established by the CPUC prior to implementation for the following measures³. (The IOUs will ask the CPUC to add these measures to current evaluation efforts. In the absence of a CPUC pre-program compliance baseline, the IOU's will perform a study to assess compliance for these measures.)</p> <p>SEER 13 air conditioners: TBD Storage water heaters: TBD Nonresidential window U-factor and SHGC: TBD Mandatory requirements for duct sealing: TBD Quality insulation installation: TBD HVAC quality installation: TBD</p> <p>The pre-program compliance baseline for each building department that will participate in the holistic element will be established by the CPUC prior to implementation. (In the absence of a CPUC pre-program compliance baseline, the IOU process evaluation will include an assessment of each participating building department's code compliance processes and records prior to program implementation.) Additionally, as part of the IOU's process evaluation, the IOUs will administer pre- and post-tests to plan checkers and field inspectors who participate in the role-based training in order to measure knowledge swing.</p> <p>Counter permit process: TBD per jurisdiction Number of A/C change-out permits issued: TBD per jurisdiction Plan check process and accuracy (as judged by viewing compliance documents, blueprints, permits issued, etc.): TBD per jurisdiction Field inspection process and accuracy: TBD per jurisdiction Plan checker knowledge of energy code: TBD per jurisdiction Field inspector knowledge of energy code: TBD per jurisdiction</p>
Reach Codes	<p>The baseline for new construction reach codes is assumed to be the most recent implemented version of Title 24</p>

b) Program Design to Overcome Barriers

The statewide Codes and Standards Program has four sub-programs including:

- 1) Building Codes: Advocacy, Extension of Advocacy (EOA) and CASE Studies;
- 2) Appliance Standards: Advocacy, Extension of Advocacy and CASE Studies;
- 3) Compliance Enhancement: Measure-based and holistic; and
- 4) Reach Codes (RC): Local government ordinances and green building standards.

Building Codes and Appliance Standards Advocacy sub-programs (1, 2)

C&S advocacy comprises a portfolio level strategy that complements incentive and information offerings in several ways. Since IOU incentive and rebate programs typically capture only a small percentage of the market, a transition to regulatory intervention is essential to maximize portfolio energy savings. This transition to code causes a once high-margin product to become an industry standard, thereby reducing the overall cost to society for energy efficiency. This commoditization effect, in turn,

³ Per the "California Energy Efficiency Evaluation Protocols: Technical, Methodological, and Reporting Requirements for Evaluation Professionals" published by the CPUC in April 2006, the evaluations of the Code Compliance Enhancement Programs should be launched at the same time the programs are first launched so that baseline compliance assessment can be compared to post-implementation changes in compliance.

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spurs innovation for new high-margin products since most manufacturers and other industry practitioners seek to compete in part on high-margin differentiated products.

As involuntary interventions, codes and standards are effective at breaking down market barriers such as split incentives between building owners and tenants that are difficult to overcome through incentive and information programs. Minimum code requirements direct consumers, builders' and renovation contractors' choices of materials and appliances to higher-efficiency products, thereby reducing monthly energy bills to tenants. Regulations also improve equity in benefits from IOU customer investments in energy efficiency through rates. Through codes and standards, positive changes initiated through voluntary programs targeting early adopters are extended to all customers. Hence, hard-to-reach groups that do not participate in voluntary offerings benefit through C&S.

Baselines for building and appliance advocacy activities are developed in two ways. If the objective of a code proposal is to update an existing standard, the baseline is simply the existing standard. If the objective is a new standard, which expands the scope of building or appliance efficiency regulations, the baseline is established through market characterization studies prior to or during the development of the CASE study unless a recent preexisting market characterization study can be found. Hence, baselines for new standards often do not exist until a draft CASE study is complete.

IOU support for recent CEC code upgrade cycles – in particular, the 2003, 2004, 2006, and 2008 CEC proceedings – for new building codes and appliance standards has significantly increased the rate of change in regulations compared to previous code cycles. Moreover, the scope of regulations has grown to include T-24 alterations for measures such as duct sealing when replacing HVAC system components, and numerous appliances have been added to T-20. These changes have created a significant need to extend advocacy efforts to improve industry awareness and understanding of California regulations.

Extension-of-advocacy efforts are carried out to improve the rate-of-compliance -- with Title 24 and Title 20 — as inputs to savings calculations for standards adopted as a result of the C&S program. Hence, the benefits of EOA activities are captured in the verified C&S program energy savings. Programs savings must be recalculated periodically based on recurring CPUC evaluations that include rate of compliance; however, since program attribution is based on attribution factors for code adoption that extends to compliance improvement, evaluation of changes in rates of compliance excludes additional attribution factors.

The enabling assumptions for EOA efforts are as follows. CPUC compliance evaluations will be conducted at least once during each program cycle and the IOU's will receive full credit for savings. Evaluators must sample at technology level for T-20, mandatory T-24 measures, and prescriptive measures when a prescriptive compliance approach is used. Evaluators sample at the whole building level when

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performance approach is used, with mandatory measures evaluated in sufficient detail to capture energy impacts. Evaluation must be sensitive to variations across state and in time.

In May 2007, Quantec and the Benningfield Group published an evaluation of C&S advocacy efforts, the “Statewide Codes and Standards Market Adoption and Noncompliance Rates,” in part to refine estimates of non-compliance rates assumed for 2003 and 2004 C&S advocacy measures adopted as a result of the program; however, at the time of this writing, The Cadmus Group is reevaluating compliance rates. Baseline metrics will be established based on The Cadmus Group’s reevaluation and target improvement metrics will be determined from new baseline metrics and additional evaluation. The CPUC is expected to conduct another evaluation at or shortly after the end of the 2009-11 program cycle to, once again, adjust savings for 2005 advocacy measures.

Measures identified in Table 3 are a starting point for EOA planning. Additional information and further planning will likely lead to both additions and removals, in particular, in response to adoption of new standards during the 2009-2011 program cycle. For example, 2008 Phase 1 appliance standards were adopted on December 3, 2008, and will become effective beginning January 1, 2010. Phase 2 standards will follow.

Compliance Enhancement sub-program (3)

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 long-term benefit of society. Broad compliance is necessary to level the playing field for well-intentioned suppliers and contractors who are otherwise faced with a competitive disadvantage when complying with regulations. Greater compliance strengthens voluntary program baselines, provides a solid foundation for future robust advocacy efforts, and improves throughput of California's energy-efficiency industry by removing an industry bottleneck.

The primary barriers to compliance improvement include complexity of the standards and limited resources available for enforcement by local governments and the CEC. Although education and training are not substitutes for enforcement, they increase compliance rates by generating awareness and improving understanding of regulations, and by equipping key market actors in the compliance supply chain with the tools and knowledge necessary for compliance.

The CE sub-program, which has the primary purpose to increase the number of customers complying with code,⁴ is based on the Code Compliance Enhancement Programs Protocol featured on pages 100-103 of *California Energy Efficiency Evaluation Protocols: Technical, Methodological, and Reporting Requirements for Evaluation Professionals*. Per the evaluator's protocols, Compliance Enhancement Programs require a separate program theory and logic model, and before and after measurements of compliance rates. Hence, a separate logic model for the CE sub-program is included at the end of this document. This sub-program has two elements including measure-specific and holistic.

The measure-specific element of the Compliance Enhancement sub-program includes measures for existing regulations not adopted as a result of the program; for example, these include pre-2005 Title 24 or federal standards for which no credit for advocacy is expected. IOUs propose that this element be similar to measure-specific extension of advocacy efforts with respect to evaluation.

Enabling assumptions include the following. CPUC evaluators will conduct a pre-evaluation in 2009 and a post-study in 2012 of measures included in this sub-program. Evaluations will include sampling at technology level for T-20, mandatory T-24 measures, and prescriptive measures when a prescriptive compliance approach is used. Evaluators sample at the whole building level when performance approach is used; however, mandatory measures are evaluated in sufficient detail to capture energy impacts. Evaluation accounts for variations across the state and in time. Verified energy savings are calculated based on the difference in measure compliance rates before and after implementation. Following the initial post-evaluation, recurring

⁴ [CPUC] California Public Utilities Commission, April 2006. *California Energy Efficiency Evaluation Protocols: Technical, Methodological, and Reporting Requirements for Evaluation Professionals*.

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CPUC evaluations must be conducted at least once each program cycle for measures included in future work.

The Code Compliance Enhancement Programs Protocol, used to evaluate compliance enhancement programs, also includes a correction for naturally occurring compliance (the compliance that occurs without program intervention) that IOUs recommend be deleted. This recommendation stems from the belief that the savings at risk are small since the rate of change in compliance “flattens out” soon after a code or standard becomes effective. Defining “natural” may be subjective and attribution parameters may be complex and costly to evaluate. Parsing out attribution gets in the way of a more important objective to work cooperatively with all California stakeholders.

The holistic element of the CE sub-program supports proactive building departments that seek general improvements to operations and compliance improvement processes; as such, this element complements measure-based activities. The holistic element will be implemented initially as a pilot program. The rationale behind the holistic element is based on the recognition that building departments are facing increased economic pressures and resource constraints, with no reduction in the required workloads. Given that this trend is unlikely to change in the near future, utility assistance in improving the efficiency of building department enforcement processes will effectively provide the jurisdiction with more resources to increase compliance rates. The IOUs anticipate working with approximately twelve building departments collectively to develop process improvement interventions including, but not limited to, role-based training and tools customized in accordance with program theory by market actor type and jurisdiction.

The holistic element will identify and screen potential partners based on several criteria. One of the primary characteristics of process pilot partners is using jurisdictions that have building stock characteristics that meet the program objectives. For example, one jurisdiction might have a high growth rate, thus, a high volume of both Residential and Non-Residential new construction. Another example includes a jurisdiction with a high cooling load and a high volume of HVAC-related activity and/or contractors. Still another might be mostly built-out, with a majority of the building activity devoted to remodels or renovations. Any criteria used will be established by the program in collaboration with the CPUC, with provisions for clarity and consistency in application, and documentation of these criteria.

The holistic element also requires support from the partners at multiple levels, including the Chief Building Official and the mayor or city council. At a minimum, the building department staff must be interested in and have the ability to test new tools or processes. The support might take many different forms, including allowing access to building department staff, and permit and inspection records, or officially setting optimizing compliance as a high priority for the jurisdiction.

The holistic element process improvement activities include conducting a comprehensive needs assessment/gap analysis by interviewing staff, reviewing

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permitting and inspection processes, tracking and documentation, internal communications as projects move toward completion, and available tools and resources and how they are currently used. The program will identify and create tools to help optimize existing processes and simplify enforcement and work with staff to test and modify the tools as necessary. Tools might include, but are not limited to, electronic forms, tracking software, or implementing online permitting and payment methods.

The holistic element will also offer staff and local market actor training and resources, and will document best practices and lessons learned in each jurisdiction. The program will work with California Building Officials (CALBO), CEC, and local government partners to encourage other jurisdictions to adopt successful practices and tools identified during the pilot. By encouraging more jurisdictions to use the same or similar processes, tools and forms where possible, compliance will be simpler for market actors, as enforcement will become more consistent.

In addition to supporting the CPUC's impact evaluation, which will involve establishing pre- and post-program compliance rates per participating jurisdiction, the IOUs will document training and process improvement efforts employed per jurisdiction, administer pre- and post-tests to gauge training participants' knowledge swing, and gather and measure implementation of action plans from participating building departments.

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Reach Codes sub-program (4)

The Reach Codes sub-program will develop and/or support the development of reach codes, or locally adopted ordinances, that exceed statewide minimum requirements. Reach codes are typically codes adopted by local governments and provide a means to test new codes, as well as testing the efficacy of increasing the stringency of existing codes at a local level prior to disseminating the code on a statewide basis. Each jurisdiction's experience with local codes can be used to inform the state's process by documenting both the successes and barriers faced for both adoption and implementation.

The Reach Codes sub-program relies on a demand-side philosophy, similar to the general philosophy guiding all other energy-efficiency activities. Rather than looking first to supply-side options (new codes), the program asks two standard DSM questions to frame the discussion. The answer to the first question, "What do we want?" is the easiest--more energy savings. However, the answer to the second question, "How do we get it most efficiently?" is less obvious. In response, many local governments have adopted reach codes to directly increase the efficiency of new buildings within their jurisdiction, or in some cases just the buildings owned by the local government. However, based upon the most recent Codes and Standards EM&V report, (Quantec study performed in May 2007), the non-compliance rate with the existing 2003 code is approximately 25-30%, leaving a tremendous amount of savings on the table. What many local governments are not aware of is that there are significant savings available from optimizing compliance with the existing code that likely exceeds the potential savings available through adopting a reach code. The most immediate, cost-effective way to obtain more energy savings and reduce the carbon footprint of each jurisdiction is to optimize compliance with the existing code.

The program will encourage all local governments to first optimize compliance with existing codes. In addition to the biggest savings opportunity, sub-optimal compliance with the existing code will erode potential savings from a new code. The reach code sub-program is designed to facilitate mutual support from the utilities and local governments to realize the full savings potential from codes, both statewide, and at a local level.

The IOUs will request that prior to adopting any new codes, building department staff attend role-based training, as well as relevant measure-specific training (HVAC replacements, controls under skylights, etc.), and to identify, implement and document two actions designed to increase compliance. Examples might include: conducting outreach to market actors in the community, adding or expanding online services, providing a financial incentive to those who submit required compliance documents, or offering rewards such as expedited plan check services for contractors with high compliance rates. Incentive programs may also require acceptance testing to improve energy savings from installed equipment and provide incentives to contractors to participate in advanced hands on training. Observations of contractor performance at the hands on training can in turn be used to improve the acceptance test methods or materials for the next round of standards.

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Many local governments, eager to act in the absence of federal leadership, have passed local ordinances that are more stringent than minimum state requirements. While the intention is honorable, the volume and variety of codes has resulted in an extremely inconsistent structure that changes frequently, making it nearly impossible to track or learn. A contractor, designer or builder working within a single county might have to comply with ten different energy or green building codes, depending on which city a project is in, and whether it's in or outside of city limits. This kind of fragmentation causes confusion and even contempt for the code, resulting in resistance from both the market actors and enforcement personnel, and ultimately lowers compliance rates. The IOUs propose a coordinated development approach to reduce the wasted energy and cost resulting from duplication of efforts. In addition, coordinated development provides better staging for statewide adoption, leverage for local governments to encourage adoption, and increases the likelihood of adoption and compliance.

The program will work with interested local governments as well as others including, but not limited to, IOU voluntary rebate programs, CEC, Building Standards Commission, the Local Government Commission (LGC), IOU green or sustainable communities programs, regional local government associations, and organizations that promote green-building rating systems, to identify characteristics of reach codes that meet the needs of the majority of jurisdictions. The IOUs will then develop a package of climate-zone based reach codes for both new construction and existing buildings (at time of sale). The IOUs will submit the package to the CEC to obtain pre-approval as required to eliminate local government development costs and facilitate subsequent adoption of the code(s). At present, there are approximately a dozen local jurisdictions with reach code ordinances surpassing Title 24-2005 approved by the CEC, all of which are different. Going forward, there is an opportunity to develop a pre-approved reach code based upon surpassing Title 24-2008. Reach codes may also include codes targeting government-owned buildings or particular activities such as commissioning.

The main enabling assumption for the Reach Code sub-program is the resolution of an outstanding policy issue related to efficiency activities undertaken as a result of legislative or other policies. Current thinking on this topic presumes that any action required to meet a code or standard is not eligible for incentives and rebates. Thus, the constituents of a local government that passed a reach code could not obtain financial assistance from utility incentive and rebate programs to help meet that code, as they would be classified as free riders.

The utilities and local governments recognize that this policy may have unintended consequences, especially in light of the long-term strategic policies that must be implemented to reduce California's Green House Gas (GHG) emissions sufficiently to meet statewide reduction goals as set forth by AB32. The effective result of the current interpretation of the policy "punishes" innovators and market leaders by eliminating access to incentive and rebate programs to assist these leaders in

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achieving additional energy savings. In most cases, reach codes were adopted based upon the expectation of continuing eligibility for incentives and rebates.

The program assumes that citizens of a jurisdiction or agency that passes a reach code be deemed eligible participants in incentive and rebate programs administered under the auspices of the CPUC, consistent with the treatment of California-owned buildings responding to the Governor's Executive Order (S-20-04) requiring state buildings to reduce energy usage by 20% by 2015. This interpretation can set up a positive energy-efficiency feedback loop wherein participation in incentive and rebate programs increases because of the reach code, and the availability of incentives and rebates to assist code compliance encourages more local governments to adopt a reach code.

Baselines: For new construction (including renovations, additions, and replacements) reach codes, the IOUs assume Title 24 as the baseline. A Title 24 baseline provides a conservative savings estimate, is consistent with new construction incentive programs, and eliminates any potential overlap with the Extension of Advocacy savings claims.

Time-of-Sale (TOS) reach codes for existing buildings assume that no energy actions are undertaken absent the code. There are currently only two TOS codes that the program is aware of in California. The scopes are both very limited, and in at least one case, the code is not routinely enforced. Therefore, assuming that building owners do not undertake any energy-efficiency retrofits at TOS absent a specific requirement is a reasonable assumption consistent with the rationale for the proposed new construction reach code baseline.

Enabling assumptions include a "shared savings" claim mechanism for attributing savings impacts resulting from reach codes. In a jurisdiction with a reach code, savings resulting from participants in the relevant incentive or rebate program (new construction or retrofit) will be claimed by that program, consistent with current practice. Savings resulting from completed projects that do not participate in an incentive or rebate program will be claimed by either the Codes and Standards or Government Partnership programs, if one is extant.

In addition to local governments, various agencies such as school districts, colleges, universities, and industry groups are adopting reach-code policies. Examples include:

- Collaborative for High Performance Schools (CHPS) as adopted by school districts;
- Green building requirements adopted by the UC, CSU, and community college districts;
- Leadership in Energy and Environmental Design (LEED) and GreenPoint Rated as adopted by various agencies, builders and jurisdictions; and
- American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 189: High Performance Green Buildings is expected to be adopted by agencies and local jurisdictions.

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In many cases, the IOUs were involved in the development, adoption, and deployment of these reach code programs. The primary intent of the IOUs involvement was to increase participation in EE programs. The impact of these programs needs to be recognized in the evaluation process, as they tend to raise the baseline for code compliance for program participants and non-participants. For example, the baseline for schools in a district with a CHPS policy resolution may have a much higher efficiency baseline as a result of the efforts of the IOU from participation in both the Savings By Design program and CHPS, even though there was no legal requirement to exceed the code.

Going forward, the C&S program will be working on the development of new and updated reach code rating systems, standards, guidelines, etc., most of which be based upon the new Title 24-2008. These reach code programs are expected to be adopted and implemented with the support of the IOU C&S program by various agencies, institutions, and building associations. Although there have been cases where the mere adoption of reach code programs have little to no impact, there have been a number of cases where significant savings have been verified.

Examples of where verification processes are in place include the CHPS Verified program and the CHPS deployment at Los Angeles Unified School District (LAUSD). The CHPS Verified program (http://chps.net/chps_schools/Verified.htm) provides project review, design review, and construction review of school projects to verify compliance with CHPS requirements. This is a fee-for-service program that provides a rigorous review of the project prior to Department of State Architect (DSA) plan review which generally results in the overall reduction in time and cost for the school design and construction process. In the case of the Los Angeles United School District (LAUSD), the district worked with consultants (including Global Green) to integrate CHPS into their internal quality assurance process that involved the design teams and all LAUSD design, construction review, and maintenance and operations staff. The C&S program proposes to review these and similar compliance improvement programs and processes and will implement them accordingly to maximize the energy savings associated with the reach code programs.

To the extent that the C&S program is able to increase compliance with these reach code programs, the resulting savings should be reflected in buildings that result in above-code performance. In addition, to the extent that the IOUs were and will be involved with the development and deployment of these reach-code programs, the energy savings should be treated similarly to the reach code ordinances adopted by local government jurisdictions.

Based upon precedents that allow eligibility for above-code incentives for state and federal agencies with executive orders (for example, Governor's Executive Order (S-20-04) requiring state buildings to reduce energy usage by 20% by 2015) for mandatory above-code construction of their buildings, the IOUs propose similar treatment of these reach code policies.

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c) Advancing Strategic Plan goals and objectives

Through the C&S program, SCG, SDG&E, SCE and PG&E will combine advocacy, compliance enhancement and reach code development efforts to meet the codes and standards goals defined in the Strategic Plan in section seven. Please see Section 6, Program Goals, Objectives & Action Strategies, for the specific action strategies the IOUs will employ in order to meet the Strategic Plan's codes and standards goals.

Due to the long, code upgrade cycle, the process of developing CASE and research studies may extend past the end of the program cycle; therefore, funding committed prior to the end of 2011 will be available for four years thereafter to fund these studies. This might entail moving the committed funds forward into subsequent program cycles until these studies are completed.

6. Program Goals, Objectives & Action Strategies

a) If applicable provide a description for the sub-program components

The statewide Codes and Standards Program has four sub-programs including:

- 1) Building Codes: Advocacy, Extension of Advocacy and CASE Studies
- 2) Appliance Standards: Advocacy, Extension of Advocacy and CASE Studies
- 3) Compliance Enhancement: Measure-based and holistic
- 4) Reach Codes: Local government ordinances and green building standards

b) Program goals which are general statements about the results to be produced by the program

In general, the goals of the C&S program are the same as the two C&S goals defined in the C&S section of the Strategic Plan. Through the Advocacy sub-programs, the IOUs will strive to continually strengthen and expand building and appliance codes and standards as IOU efforts reveal greater efficiency opportunities and compelling economic benefits. Through the Compliance Enhancement sub-program, the IOUs will strive to improve code compliance using education and outreach. IOUs will also develop reach codes and facilitate their adoption and implementation in motivated communities.

The following narrative and table details the specific actions the C&S program will use to carry out the C&S goals defined in the Strategic Plan and the program outputs linked to each action strategy.

In addition to striving to meet the two codes and standards goals defined in the Strategic Plan, the IOUs will work in concert with other programs within the energy-efficiency portfolio to help meet associated goals, such as those defined for HVAC, local governments and workforce education and training as described in Section 8, Coordination & Integration, of this Program Implementation Plan.

Strategic Plan Codes and Standards Goal #1: Continually strengthen and expand building and appliance codes and standards as market experience reveals greater efficiency opportunities and compelling economic benefits. (Sub-programs 1 and 2: Building Codes and Appliance Standards Advocacy).

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The C&S program will provide a direct response to the CPUC's goal by specifically addressing each near-term strategy in the Strategic Plan. Through the advocacy activities, the program will:

- Continue to expand Title 24 Building and Title 20 Appliance Efficiency Regulations through improved research to identify current code and compliance shortcomings, new technologies and processes, and latest thinking on breadth (scope) and depth (stringency) of possible standards;
- Develop aggressive proposals to accelerate regulations for both Title 20 appliance efficiency standards and Title 24 building standards;
- Support leading activities such as statewide reach standards (for example, codes that include California Green Building Standard) and the coordinated development and adoption of advanced local government ordinances; and
- Coordinate with both internal and external organizations on an ongoing basis, including voluntary programs and national standards organizations.

The Strategic Plan outlines five strategies to strengthen and expand building and appliance standards. The C&S program intends to address each strategy through the advocacy sub-programs as follows.

Strategy 1-1: Develop a phased and accelerated approach to more stringent codes and standards.

The C&S program seeks to accelerate the adoption of increasingly stringent building and appliance standards. To this end the program will develop proposals to increase the scope and stringency of Title 20 and Title 24. The C&S program will also develop or support development of more stringent codes, such as the California Green Building Standard, ASHRAE Standard 189, and other model code ordinances, which would significantly exceed the current Title 24 requirements and could potentially become a model for local green building ordinances.

The use of discrete, above minimum code tiers of efficiency standards (for example, reach codes) have been proven to be an effective way to promote energy efficiency, prepare the market for high efficiency equipment in an orderly way and smooth the transition for more stringent future standards. However, the proliferation of many standards for the same product renders confusion in the market place and hinders compliance. The C&S program will work with local governments that currently have or are considering adopting advanced energy codes to identify common themes among their primary objectives and develop a set of model reach codes and standards that form the path for subsequent statewide adoption. The C&S program will help local governments improve compliance by developing compliance forms, modify performance software, and provide code compliance training to practitioners and building departments

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Historically, approximately 100,000 single-family homes and 50,000 multi-family dwelling units are constructed each year. Estimated construction for 2009 is projected to be much lower: SF 30,000 single-family units and 33,400 multi-family units.⁵ These buildings are within the scope of the Title 24 energy code. There are about 8 million existing single-family homes and 4 million existing multi-family dwelling units in California.⁶ Since homes are sold on average every seven years in California⁷, approximately 1.4 million existing homes and (assuming same turnover for rental properties) 570,000 existing multi-family units are sold each year. Thus, requirements for the most basic efficiency measures (attic insulation, weather sealing etc.) installed at time of sale would have a huge impact – potentially impacting 10 times as many residential buildings as do the current residential standards. The C&S program will work with local governments to identify existing barriers and develop model time-of-sale requirements, such as Home Energy Rating System (HERS) audits, and commissioning for commercial buildings that do not unnecessarily hinder real estate transactions or financing. Ultimately, if the pilot program with local governments is successful, it will make the case for a statewide time-of-sale requirement.

HVAC. The efficiency of heating and cooling systems is central to building energy-efficiency standards and has become an even more significant component of the standards through the adoption of time-dependent valuation. Energy losses from ducts can be a large fraction of heating and cooling loads. The Title 24 standards have mandatory requirements for duct sealing and prescriptive requirements for duct testing and verification by a HERS rater. Feedback from duct tests to HVAC contractors and homebuilders is a very important mechanism for transforming the market. Thus, the C&S program will be pursuing the concept of mandatory requirements for duct testing and self-certification of the test while still including the prescriptive requirement for a HERS rating. Similar to the acceptance tests in the nonresidential market, a self-certified duct pressurization test would be required for all residential duct systems in unconditioned spaces that are not obtaining a HERS verified duct test.

The systems not receiving HERS duct-sealing verification would receive the same energy penalty in the performance approach and the systems would not be allowed in the prescriptive method approach. This requirement would reduce enforcement uncertainty, as every duct system would be required to be tested. Since all duct systems are required to be tested, this lowers the incremental cost barrier for a HERS-verified duct test and assures that mechanical contractors and homebuilders receive the feedback from duct testing on every job. This same approach would be taken for

⁵ Construction Industry Research Board, California Construction Review, Private Building Construction, January 22, 2009.

⁶ <http://www.dof.ca.gov/HTML/DEMOGRAP/ReportsPapers/Estimates/E8/E-8.php>

⁷ Median duration at residence is 7 years for homeowners and 1 year for renters. Jason P. Schachter and Jeffrey J. Kuenzi. US Census. Seasonality of Moves and The Duration and Tenure of Residence: 1996, data extracted from Figure 4. Duration of Current Residence by Current Tenure: 1996.

<http://www.census.gov/population/www/documentation/twps0069/twps0069.html>

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relatively new requirements for measurements of airflow, fan power, duct-pressure drop and refrigerant charge.

C&S will prepare CASE studies to evaluate the cost-effectiveness, market status and availability of the equipment to determine the potential for revising the building efficiency standards so they are based on enhanced efficiency HVAC systems such as: radiant cooling with a dedicated outside air system, evaporative condensing, direct/indirect evaporative cooling and ground coupled heat pumps. These and other cooling technologies have the potential to be significantly more efficient than the federal air conditioning regulation but may be exempt from federal preemption. For federally-regulated cooling equipment, the C&S program will continue working with the federal DOE to develop regional air conditioning standards that would be more appropriately suited to California's warmer and drier climate.

Envelope performance testing. Similar to the requirements for performance testing of HVAC installations, the performance testing of the envelope of homes and other residential dwelling units provides direct feedback on the level of infiltration. Thus, testing could transform the building industry. C&S will evaluate the feasibility of adding mandatory requirements for blower door tests for all new homes. Similar to the requirements for duct testing, the prescriptive baseline would retain the HERS verification requirements, but for those homes wishing to avoid the HERS requirements through a performance trade-off, the blower door test would still have to be performed.

Strategy 1-2: Expand Titles 24 and 20 to address all significant energy end uses
The Codes and Standards program will pursue additional energy savings by broadening the scope of the Title 20 appliance standards and the Title 24 building efficiency standards. Title 20 proposals will be developed and supported through the public stakeholder process for both current and future proceedings. Current proposals include: battery chargers, portable lighting fixtures, set top boxes, televisions, computer monitors, game consoles, etc. Future proposals will include office equipment and other miscellaneous and plug loads. Integration activity with voluntary codes and program activities will be increased to expand potential for new product categories to be added to the measure list. C&S will continue to support the Title 20 proposals after their adoption by providing ongoing technical assistance to the CEC to fend off post adoption maneuvering by oppositional stakeholders, which has increased in recent years. This will reduce post adoption exemption of product classes.

For the 2008 revisions to Title 24, the C&S program successfully proposed a bold increase in scope to include refrigerated warehouses. For 2011, the C&S program will consider increasing the scope of the standards to include the refrigeration plant small walk-in refrigerated coolers and refrigerant plants serving display cases in supermarkets. The C&S program is also pursuing other opportunities with computer room cooling, and other process measures, such as compressed air systems.

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In the past, energy codes have focused only on the efficiency of the equipment installed and not on how that equipment functions, and recent field studies have found that a significant number of controls do not work correctly. Thus, the C&S program will be reviewing the efficacy of fault detection and diagnostic (FDD) controls to determine their effect on operators taking subsequent action to correct the problem when notified. The C&S program will also investigate barriers to sub metering tenant units and major building energy consuming systems such as lighting, chiller plants, boiler plants, etc. Pending approval from the CPUC that water savings are within the scope of IOU energy and resource conservation programs and should be pursued, the C&S program will research requirements for water meters on all new buildings.

With the new administration's focus on energy efficiency, we can expect, at a minimum, more opportunities to increase the stringency of Title 20 standards through federal proceedings. If the new administration increases the budget for DOE staff, we can expect an even greater acceleration in activities than the already rapidly increasing number of DOE proceedings. Increased DOE funding would provide the opportunity for states to petition DOE for new rulemakings and/or waiver petitions in support of California energy savings.

The C&S program will work in conjunction with national organizations to align California's reach goals with LEED, Green Globes, CHPS, etc. Ideally, satisfying California's Green Building Standard would become the minimum threshold to apply for a LEED rating. Likewise, the C&S program will work with ResNet and California HERS Providers on the development of further home rating system upgrades and rating techniques.

Strategy 1-3: Improve code research and analysis

Research and analysis is the basis of upgrading energy codes. In some cases this research is forward looking and identifies technologies that have sufficient market experience, cost-effectiveness and broad applicability to be deemed "code-ready." This research can also be retrospective for two major categories of energy savings opportunities:

1. Review of code proposals that were unsuccessful in past code cycles, but appear to have promise due to changes in the market, refinements in the technology or new information etc.; and
2. Evaluation of current standards for loopholes, inconsistencies, enforcement barriers, etc. The savings from these issues can be substantial and must be actively researched.

More generally, the program will seek to improve C&S advocacy by developing new approaches to determining incremental costs, availability, and reliability. In particular, cost information is considered confidential by industry representatives, who generally oppose code upgrades, so the success or failure of a standards proposal often turns on the perceived accuracy of incremental costs.

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Due to the increasing complexity of the targeted measures and increasing sophistication of oppositional stakeholder tactics during the public process under both Title 20 and 24, a greater emphasis on more thorough market research, product performance measurement and technical production data is necessary. Existing studies may be expanded, new studies may be designed and implemented, and additional market research may be purchased to facilitate future standards development. New or updated test methods are required to pursue significant savings opportunities left stranded by current incomplete test methods (for example, high temperature performance metrics for cooling systems and variable speed capability of commercial refrigeration equipment).

Codes research also needs to consider more than just technologies but also design methods. A “big bold” research topic for Title 24 is a whole building approach to building design. This concept is in support of a requirement for compressor-less or “hybrid” cooling systems in the homes in the more temperate California climate zones. Well-designed homes in the mild coastal regions of California do not need air conditioners. These homes often have thermal mass to dampen the diurnal temperature swings when it is hot outside so the thermal comfort of the home isn't solely dependent on the air temperature of the home, but also the radiant temperature. C&S will pursue the potential of providing Title 24 compliance credit to homes that do not have air conditioners, as long as it can be reasonably expected that occupants in these homes will be comfortable enough that these homes will not be retrofitted with air conditioners in the future. This approach would likely require an enhancement of the existing performance method simulation tools, or require newer simulation tools such as Energy Plus, which has a thermal comfort model. This would require a significant investment in resources. However, if this concept were implemented, it would move new homes in coastal regions significantly closer to the 2020 net zero homes goal.

This same concept can also be applied to commercial buildings, with greater attention given to comfort due to tasks being conducted in fixed positions and locations, and greater attention to internal heat gains resulting from plug loads and lighting loads. However, better thermal mass and comfort models will advance low-energy commercial buildings, as this would also benefit the characterization and ultimately the design of passive solar commercial buildings assisted with radiant heating and cooling. Energy Plus also promises the capability of modeling airflow, which should provide improved confidence in specifying two other low energy HVAC systems: positive displacement ventilation and natural convection.

Initially advanced tools require advanced users. Thus, training in low-energy design principles and methods of predicting building performance training is needed for the next generation of architects and engineers starting out in practice and currently attending California architecture and engineering schools. Thus, training is needed in a number of different venues: for existing practitioners, training opportunities at utility training centers, and at professional conferences. Student training would be most efficiently conducted as part of their normal curriculum. Sponsored curriculum

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development and sponsored research in the design of efficient buildings results in career long impacts when combined with other broader society-wide incentives for low energy design.

Even more advanced interfaces to these tools expand the scope of potential users by simplifying the user's inputs, but requiring sufficient detail in the nomenclature used by designers, so these tools can predict the energy impact of design choices with reasonable levels of accuracy. These program interfaces must have enough flexibility, so the breadth of applications is wide enough to affect a sizable portion of the possible building applications, and the scope of measures is sufficiently broad. Training is still needed for these simplified tools, but is accomplished in less time and is given to more people, as there are more people likely to use the tool. Easier to use tools expands likely users to sales people, manufacturer representatives and facility managers.

In addition to the fairly sophisticated tools to support these advanced designs, a segment of the market will be drawn to design approaches that are formulaic. These approaches may not optimize energy savings, but if the prescriptive cookbook method is well designed, they can yield significant levels of reliable savings. This requires a significant effort in exercising the design tools, comparing the simulated results to actuals and synthesizing the results into design standards. These design patterns then must be transmitted in a number of ways including resource documents, training materials and presentations.

The energy consumption of buildings is not purely a function of their components but is impacted by occupant behavior and actual equipment installation and performance. Field studies are an important method of feedback on how much energy is really saved by a measure. In some cases this research can leverage information from CPUC EM&V studies and CEC load forecasting studies.

Another significant source of market and technology data is the utility energy-efficiency programs. The C&S program will periodically poll the program managers for information concerning market share, technology cost and verified energy savings. The energy-efficiency programs will likely identify technologies that may be ripe for code adoption and can help develop the market experience that differentiates those products that are truly code ready.

The importance of the statewide utility Emerging Technology (ET) program will increase as source of information and potential measures for voluntary reach-code tiers. Although available in the market, the measures that are assessed in the ET program may be neither cost-effective nor fully applicable for mandatory standards. In some cases, it may be appropriate to have measures simultaneously included in utility energy-efficiency programs, as well as reach code tiers.

Also related to field studies are process evaluations of how the code is administered from the designer and specifier, to T-24 analyst, to plan check, to bidding, through

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construction to inspection to occupancy. The delivery of efficient buildings relies on each step of this process. Transferring this information to the CEC and code proposal developers increases the likelihood that compliance will increase with the next energy code.

Strategy 1-4: Improve coordination of State energy codes and standards with other state and Federal regulations.

The development of the California energy-efficiency standards does not occur in a vacuum. Much of the technical basis of Title 24 rests on consensus standards developed by ASHRAE (American Society of Heating, Refrigerating and Air-conditioning Engineers) and IESNA (Illuminating Engineering Society of North America.). The measurements of product properties rely on test standards developed by DOE; American Society for Testing and Materials now referred to as ASTM International (ASTM); Air-Conditioning, Heating and Refrigeration Institute (AHRI); National Fenestration and Rating Council (NFRC); Cool Roof Rating Council (CRRC), etc. Although the C&S program works most closely with the CEC, other California state agencies are also involved with the development of efficiency standards. Examples of coordination with other state agencies may include, but are not limited to, the California Air Resources Board (CARB) as codes relate to greenhouse gas (AB 32) and other emissions, Department of Toxic Substance Control (DTSC) as codes relate to toxic waste from lamps, and California Department of Water Resources (DWR) as codes relate to the water use in HVAC systems. In addition, there is much to be learned and many benefits derived from coordinating with ASHRAE and other states that are developing their own energy codes. Thus, the C&S program will be coordinating with other entities in the development of test standards and other consensus standards.

The C&S program will also participate in the development of other standards that can then be applied in California. The most notable of these is the Federal appliance efficiency regulations and international standards, which are likely to have bigger impacts on Federal and state appliance standards in the future. If the C&S program continues to influence the outcome of these regulations, nominal savings in California will be achieved. Since the Federal regulations apply to all sales in the US, compliance enforcement is easier. The program will continue to take a leadership role in advocating for new legislated standards (often based on Title 20 standards in the past) and in both negotiated and contested DOE appliance standards rulemakings. In view of the increasing international coordination in the codes and standards arena, The program will take a more influential role in influencing international test methods and standards framework developments where there is significant opportunity to affect federal and CA appliance standards. We fully expect the need to travel to other countries to conduct effective collaboration and coordination of standards activities that potentially affect California. Increased coordination with national voluntary program frameworks including CEE and Energy Star are also likely to increase C&S efficacy.

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Federal appliance efficiency standards limitations have been a hindrance to more stringent codes in California. These Federal standards preempt the state from requiring additional labeling, higher appliance efficiency standards, and prevent building efficiency standards from requiring higher efficient equipment than equipment that are minimally compliant with the Federal appliance standards. Given that the Federal regulations cover the largest energy consuming devices (lighting, air conditioners, water heaters), this has seriously constrained the effectiveness of California's appliance and building efficiency standards in California. The C&S program will be developing a research plan to address Federal pre-emption including, but not limited to, waiver petitions, federally legislated standards, and development of new coalitions.

The CARB's proposal in response to SB 97, which requires rules be developed to address the California Environmental Quality Act (CEQA) requirements for greenhouse gas emissions, expands the possible scope of energy consumption that could be regulated. Well-defined efficiency measures and performance trade-off options would be in the interest both of CARB and the entity submitting a new industrial, commercial or residential project.

In addition to the coordination with DWR for the water use in HVAC systems noted above, there is an ongoing CPUC proceeding to determine the amount of energy embedded in water use. Therefore, the C&S program will further coordinate with the DWR as studies are initiated to examine potential reductions in water use. Since the CEC was given jurisdiction over water use starting in 2008, it is anticipated there will be new sections in Title 24 regulating the use of water.

Also as mentioned earlier, C&S will pursue developing reach codes in coordination with the California Green Building Standards. To do this the C&S program will coordinate with the BSC (Building Standards Commission), the CEC (California Energy Commission), HCD (Housing and Community Development), OSHPD (Office of Statewide Health Planning and Development), Local Governments, and others.

Strategy 1-5: Improve coordination of energy codes and standards with utility programs

Coordination between C&S and other utility programs may occur in various ways: existing or newly adopted standards, future standards, direct linkages between incentive programs and a specific standard, and long-term integrated planning. This is a rapidly evolving area, so planning is necessarily at an objectives level for now. C&S program staff will periodically meet with other utility program staff to facilitate ongoing coordination.

Newly adopted standards. On an ongoing basis, C&S staff communicates with IOU incentive program managers regarding potential adoptions of new standards.

Depending on the opportunity, program managers may decide to provide incentives for measures in advance of the effective date to prepare the market.

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Education and training between adoption and effective dates of a particular standard represents another way to prepare industry. C&S will provide 2008 Title 24 training to both market actors and internal program staff in advance of the August 1, 2009, effective date for the 2008 Title 24 Standards. The training will help identify opportunities for ongoing coordination between incentive programs and C&S activities. Another activity under development is to require program participants to complete and submit the applicable acceptance tests required by Title 24 to receive an incentive for HVAC and lighting controls equipment. This will increase compliance with the acceptance tests and help assure the incented equipment is installed according to code intent.

Although all utility programs are impacted by codes and standards, particular focus will be placed on coordinating with the Local Government, HVAC, and Workforce, Education and Training (WE&T) programs. Please refer to Section 8, Coordination & Integration, for how the program will coordinate efforts to help meet shared goals defined in the Strategic Plan.

Future standards. Having selected topics for potential CASE study proposals for the next code cycle, for example, 2011 building and appliance standards, energy-efficiency program managers may be able to include measures in programs to improve code readiness. The C&S program may also work with statewide Emerging Technologies program staff to identify new technologies for which to develop alternative calculation methods (ACM). CASE studies can be developed for new technologies to propose Title 24 credit towards achieving compliance, thereby reducing one barrier to market acceptance. Moreover, a Title 24 ACM provides an approved method for calculating energy savings for incentive programs.

The C&S program will continue to improve coordination with the statewide new construction programs. Since the success of these programs are dependent on exceeding the current Title 24 codes, they serve as a useful “test-bed” to inform the development of future Title 24 proposals by highlighting the more cost effective measures, flagging problem areas with compliance, and demonstrating the extent to which the current code can be exceeded.

On a longer-term basis, it is sometimes possible to identify code objectives two code cycles into the future. This will be particularly critical for developing an appropriate trajectory for reaching the Strategic Plan’s zero net energy goals, AB 1109 Huffman Bill goals⁸, and state policy initiatives indicated in the previous section. For these opportunities, C&S will complete a gap analysis to identify distance between code readiness attributes and the current market status of the technology, which will inform the creation of an integrated long-term coordination plan. Long-term information repositories may be developed to collect information that will support adoption in a future code cycle.

⁸ AB 1109 Huffman directs the CEC to implement strategies to reduce residential lighting by 50% and commercial and outdoor lighting by 25% by the year 2018.

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Direct linkages. The C&S program seeks to directly link, as has been done for the current Title 20 television proposal before the CEC, code proposals with incentive programs. When faced with industry resistance, this linkage constitutes a stronger argument before the commission. Moreover, linking a standard with an incentive program creates a synergy in which the push of a widely recognized future standard reinforces the pull of near term incentive programs, thereby increasing participation in a complementary incentive program.

Albeit weaker compared to direct linkages, the synergy between standards and incentive programs exists more generally through indirect linkages.

Strategic Plan Codes and Standards Goal #2: Improve code compliance and enforcement. (Sub-programs 3 and 4: Compliance Enhancement and Reach Codes)

The C&S program is committed to improving code compliance and enforcement. To demonstrate this commitment, C&S will expand Extension of Advocacy activities and launch the new Compliance Enhancement (CE) sub-program. The program will leverage existing, and develop new education and outreach activities to equip both building and appliance industry market actors with the knowledge and tools needed to comply with Title 24 building energy-efficiency standards and Title 20 appliance efficiency regulations. Expanding the program to include CE will help ensure that the full potential of the state's codes and standards efforts are realized, and results in a comprehensive C&S program.

The C&S strategies and activities listed in the Strategic Plan are focused primarily on Title 24 building energy-efficiency standards, noting that appliances are principally regulated at the federal level rather than the state level. As the CPUC Strategic Plan also notes, there remains huge potential savings at the state level for appliances and equipment not regulated by the federal government. With this in mind, C&S has added activities to capture Title 20 compliance savings as well and added a sixth implementation item for this program cycle in the Strategic Plan Table below to document planned Title 20 efforts.

Strategy 2-1: Improve code compliance and enforcement.

The Strategic Plan identifies one strategy and five activities targeted to improve compliance and enforcement with Title 24 building energy-efficiency standards. Each activity is addressed in order below.

Activity 2-1 a): Conduct research to determine high-priority tactical solutions for code compliance and focus efforts accordingly.

As a first step in launching compliance improvement efforts, Program staff will interview the building industry market actors included in the compliance supply chain to determine how their current performance compares to the desired performance, the reasons for the gap, and which performance improvement solutions the C&S program may employ to improve code compliance. Additionally, C&S staff will interview experts who have been providing training, software and regulatory support to industry

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practitioners over the years to identify best practices, possible points of collaboration and gaps the C&S program can help fill. Furthermore, C&S will conduct a process pilot with several local governments to investigate code enforcement processes in detail, identify opportunities to streamline enforcement practices and improve consistency across jurisdictions. Results of these research efforts will inform the total package of performance improvement solutions the program will implement to help improve code compliance rates. In addition, the results of the compliance improvement process study that included a stakeholder roundtable discussion will be compared with the interviews.

Activity 2-1 b): Increase training and support for local building code officials. Building code officials are the primary key to improving compliance with Title 24 standards and certain Title 20 regulations such as residential air conditioning equipment. Building department personnel must enforce several different building codes simultaneously, with limited resources. Given the limited time available, officials correctly prioritize those codes related to life-safety, which often results in extremely limited time and resources dedicated to enforcing energy-related codes. In addition to resource limitations, energy codes have undergone much more significant changes in each of the recent code updates than most other codes, thus creating a challenge for officials to maintain their expertise.

EOA and CE will focus a significant percentage of the code education resources on providing training and support to building code officials. Based on research results, EOA and CE will develop role-based training courses and abbreviated code guidelines for plan checkers, inspectors and counter staff specifically targeting only those sections of the code related to each particular position. This work will be closely coordinated with the CEC and third party efforts to ensure that it supports and is in alignment with the CEC's compliance improvement efforts.

In addition, in response to the needs assessment to be conducted as part of the local government process pilot, CE will develop and test process improvement tools, and will work with CALBO, the International Code Council (ICC), and CEC to conduct outreach to other jurisdictions to encourage adoption of those tools. CE will conduct outreach and encourage other jurisdictions to adopt tools and processes that help building officials increase compliance. CE will support more consistency across jurisdictions, in processes, documentation requirements and enforcement practices, and will encourage the expansion of submitting online permitting paperwork for HVAC replacements, as well as other measures. These on-line submittals allow for the creation of customized inspection checklists that also simplify enforcement.

CE will also work with the CEC and HERS providers to ensure the new HERS documentation and data management systems are consistent and serve to streamline the compliance process.

Activity 2-1 c): Investigate regulatory tools such as licensing/ registration enforcement.

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Currently, although a licensed professional must sign Title 24 documentation, the actual calculations can be prepared by anyone. Anecdotal evidence from rebate programs and building departments indicates that the lack of training and/or professional certification requirements results in sub-par documentation being submitted to building officials, thus requiring more time to review documents and determine compliance. CE will work with the California Association of Building Energy Consultants (CABEC), CEC and CALBO to increase the stringency of the Title 24 Certified Energy Analyst test, initiate a certification process for Title 24 consultants, and begin requiring energy education for building officials as part of CALBO's existing continuing education requirements.

CE will also work with the CSLB (California State License Board) and the DCA (California Department of Consumer Affairs) to conduct outreach to members regarding the importance of the standards to the state and to their customers, and to encourage the CSLB to enforce the HVAC permitting requirements with their members.

Activity 2-1 d): Evaluate proposed changes to the code and compliance approaches to simplify and expedite compliance.

Feedback from building officials indicates that they are overwhelmed by the volume, complexity, and rapid changes to the energy codes. As a complement to the role-based training, CE will work with industry experts, CEC, and building officials to develop and test role-based and context-sensitive code guidelines. The guidelines will target specific compliance items and common measures that must be addressed at each stage in the permitting and inspection processes.

CE will conduct research to identify specific areas of the code that can be simplified by reducing the number of trade-offs and compliance options and/or transitioning to a greater number of mandatory measures.

In addition, CE will work to increase the availability of online permitting resources and the consistency of requirements and documentation across all jurisdictions, with an initial focus on geographically contiguous regions. Online permitting makes obtaining permits more convenient and less costly, and geographic consistency provides a more stable and easier-to-understand process for building designers and contractors, as well as building officials.

Activity 2-1 e): Work with local governments to improve code compliance, adopt above code ordinances, and provide training/education.

The primary goal of the CE measure-based and holistic sub-program elements is to improve code compliance. As discussed in activities a) through d) above, CE will be dramatically expanding and enhancing efforts in support of this goal, launching several different outreach and training offerings and activities.

The C&S Reach Code (RC) sub-program has adopted a demand-side philosophy to local code adoption, consistent with the general philosophy of energy efficiency.

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California has a very robust energy-efficiency code that can, if fully enforced, result in a tremendous amount of savings and reduction in both energy usage and peak demand. RC will conduct outreach to local governments and green communities through Government Partnerships Programs, Build It Green, and others industry partners to educate interested participants about the potential savings that could be realized through optimizing compliance with existing codes prior to adopting a new code. RC will inform local government's that optimizing compliance with existing codes is one of the most immediate and significant steps a city or county can take toward reducing the jurisdiction's carbon footprint, and will request a commitment from each participant to take documentable steps toward that end.

Many local governments, in their eagerness to take action in the absence of federal leadership, have individually developed and adopted unique local codes to reduce the climate change impacts of the building activities in their jurisdictions. Unfortunately, codes are developed and adopted without any real overall coordination with other jurisdictions, resulting in a plethora of local ordinances and code requirements throughout the state that are changing frequently, making it impossible to easily track what code applies in which jurisdiction at any given time. In Sonoma County alone, there are ten different local energy and green building ordinances. RC will encourage local governments to work with neighboring jurisdictions to adopt consistent requirements and to remain consistent with current Title 24 climate designations to reduce potential market confusion.

One of RC's goals for local codes is to promote consistency with the current Title 24 climate zone structure, with which market actors are used to working. RC will work with local government partners to identify and document their objectives for a local code and also with the CEC and Building Standards Commission (BSC) to make the next generation of the State's Green Building Standards meet those objectives for most, if not all, local governments. First, RC will work with local governments to support development of a package of cost-effective local energy codes that exceed 2008 Title 24 minimum requirements for residential and nonresidential new construction. RC will support efforts to obtain CEC pre-approval to simplify the approval and adoption process at the local level. In addition, to begin harnessing the tremendous savings potential from existing homes, RC will support development of a package of standards that are applicable at time-of-sale or major remodels. Local ordinances will serve as an opportunity to test the efficacy of the codes and inform regulators as to the readiness of the codes for statewide adoption.

Activity 2-1 f): Conduct outreach and education efforts to improve compliance with Title 20 Appliance Standards.

The IOUs' experience working with industry actors on Title 20 advocacy indicates that there are two primary paths for equipment covered by Title 20 to move through the supply chain from manufacturers to consumers. The first is via manufacturers, distributors and contractors, while the second is via retailers directly to consumers. Similar to the Title 24 outreach, the IOUs plan to target each actor in the supply chain

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for selected measures with significant savings potential and for which compliance rates are relatively low.

Given the wide range of industries and the organization of their distribution channels, compliance improvement activities for appliances will be conducted on an industry-specific basis. For example, compliance improvement outreach for manufacturer-dominated industries logically begins with manufacturers since top down efforts will affect most product sales in California. If major manufacturers are located overseas, as is the case of consumer electronics for example, we fully expect the need to travel to other countries to conduct effective outreach and training.

Different approaches will be used to educate and train retailer-dominated and contractor-dominated industries. In the retailer-dominated case, for example, compliance efforts must target the stocking practices of these retailers. In the contractor-dominated case, where contractors are largely responsible for the purchase and installation of the product, compliance efforts must focus on outreach to contractors.

The C&S program will coordinate with the CEC to conduct outreach to equipment manufacturers to inform them of existing code requirements, and to facilitate their compliance from both a technical and administrative perspective. Assistance will be provided to manufacturers to support their efforts to ensure equipment sold in California meets the minimum technical requirements, and to successfully complete the certification process with the CEC.

For measures such as pool pumps, where most are sold through distributors and installed by contractors, in addition to working with the pump manufacturers, the program will work directly with distributors to educate their representatives. The IOUs will also conduct outreach to contractors directly, and will work with trade organizations to leverage their existing communications networks. Outreach activities may include attending trade conferences and regional meetings, authoring articles for industry newsletters or publications, or direct contact via email or printed materials.

Other measures, such as incandescent lamps and consumer electronics, are often purchased directly by consumers through retail establishments. Though the market actors are different for these measures, the program will use similar methods to reach as many market actors as possible. Trade associations are expected to be important stakeholders in this effort and will be leveraged as much as feasible. The IOUs will coordinate with regulators and other providers to identify gaps and opportunities to collaborate.

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c) Program objectives which are more specific milestones to be achieved in order to accomplish the goals

Figure 1: Internal Planning Objectives (estimates)

Building Codes and Appliances Standards Advocacy Internal Planning Objectives (estimates)			
Sub-program Element	2009	2010	2011
Appliance Standards (State)	<ul style="list-style-type: none"> Support unfinished business from 2008 Phase 1 of current CEC proceedings, for example TVs (Percentage of CEC workshops in which IOUs present CASE studies or respond to comments) Continue development of code proposals for 2009 Phase 2 proceedings and provide ongoing advocacy for those accepted by CEC (Percentage of total potential savings that will be adopted as a result of IOU advocacy) CASE study reports filed with CEC Begin RFP process for 2011 code cycle 	<ul style="list-style-type: none"> Continue support for Phase II as necessary (Percentage of CEC workshops in which IOUs present CASE studies or respond to comments) Continue advocacy after adoption, as necessary, to clarify standards or prevent repeal Develop detailed CASE study development plans for 2011 and begin CASE study development 	<ul style="list-style-type: none"> Continue advocacy after adoption, as necessary, to clarify standards or prevent repeal (Percentage of CEC workshops in which IOUs present CASE studies or respond to comments) Continue development of 2011 CASE studies and produce final draft CASE studies, as appropriate (Percentage of total potential savings that will be adopted as a result of IOU advocacy) CASE study reports filed with CEC
Appliance Standards (Federal)	<ul style="list-style-type: none"> Conduct research, develop analytical commentary, or advocate, as appropriate on behalf of California, in all proceedings that have significant energy impacts (Percentage of DOE rulemakings for which comments are submitted) Advocate through negotiations for Federally legislated standards (Percentage of DOE workshops in which IOUs contributed comments) 		
Building Standards	<ul style="list-style-type: none"> Complete RFPs to develop CASE studies in early 2009 Develop detailed CASE study plans and begin CASE study development Conduct advocacy in support of CEC proceedings, assuming the CEC commences a rulemaking (Percentage of CEC workshops in which IOUs present CASE studies or respond to comments) 	<ul style="list-style-type: none"> Continue development and produce final draft CASE studies, as appropriate (Percentage of total potential savings that will be adopted as a result of IOU advocacy) CASE study reports filed with CEC Conduct advocacy in support of CEC proceedings, assuming the CEC commences a rulemaking (Percentage of CEC workshops in which IOUs present CASE studies or respond to comments) 	<ul style="list-style-type: none"> Conduct advocacy in support of CEC proceedings, assuming the CEC commences a rulemaking (Percentage of CEC workshops in which IOUs present CASE studies or respond to comments)

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Building Codes and Appliances Standards Advocacy (continued)			
Internal Planning Objectives (estimates)			
Sub-program Element	Targeted Measures	Initial Compliance Rate	Program Target by 2011
EOA Measure Specific T24 Activities	Residential Hardwired lighting	TBD	TBD
	Residential Duct Improvement	TBD	TBD
	Lighting Controls Under Skylights	TBD	TBD
	Ducts, Existing Commercial Building	TBD	TBD
	Indoor Lighting	TBD	TBD
	Cool Roofs	TBD	TBD
	Envelope Insulation	TBD	TBD
	Refrigerated Warehouses	TBD	TBD
	Outdoor Lighting	TBD	TBD
	Acceptance Testing	TBD	TBD
EOA Measure Specific T20 Activities	General Service Incandescent Lamps, Tier 1	TBD	TBD
	General Service Incandescent Lamps, Tier 2	TBD	TBD
	Residential Pool Pumps, High Efficiency Motors, Tier 1	TBD	TBD
	Residential Pool Pumps, Two-Speed Motors, Tier 2	TBD	TBD
	Pulse Start Metal Halide HID Luminaires, Tier 1	TBD	TBD
	Pulse Start Metal Halide HID Luminaires, Tier 2	TBD	TBD
	Consumer Electronics – Audio Players	TBD	TBD
	Consumer Electronics – Televisions	TBD	TBD
	Consumer Electronics – DVDs	TBD	TBD
	Unit Heaters and Duct Furnaces	TBD	TBD
	External Power Supplies, Tier 1 & 2	TBD	TBD
Compliance Enhancement (CE)			
Internal Planning Objectives (estimates)			
Sub-program Element	Targeted Measures	Initial Compliance Rate	Program Target by 2011
CE Measure-Specific T24 Activities	Nonresidential Windows: U-factor & SHGC	TBD	TBD
	Storage Water Heaters	TBD	TBD
	SEER 13 Air Conditioners	TBD	TBD
	Mandatory Requirements for Duct Sealing	TBD	TBD
	Quality Insulation Installation	TBD	TBD
	HVAC Quality Installation	TBD	TBD
CE Measure-Specific T20 Activities	TBD	TBD	TBD
CE Holistic T24 Activities	Number of A/C change-out permits issued per jurisdiction	TBD	TBD
	Improve plan checkers' knowledge of T24 and processes and tools used to enforce T24 per jurisdiction		
	Improve field inspectors' knowledge of T24 and processes and tools used to enforce T24 per jurisdiction	TBD	TBD
Reach Codes			
Internal Planning Objectives (estimates)			
Sub-program Element	2009	2010	2011
Reach Codes	Development of technical supporting documentation for model codes	Continue collaboration on future reach codes with CEC and other parties	Continue collaboration on future reach codes with CEC and other parties

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d) Program action strategies that will be used to implement the goals

See the Codes and Standards Alignment with Strategic Plan table below.

e) Program outputs which are measurable results of the program linked to the action strategies

See the Codes and Standards Alignment with Strategic Plan table below.

Figure 2: Codes and Standards Alignment with Strategic Plan

Strategic Plan Codes and Standards Goal	Strategic Plan Strategy	IOU Action Strategy	Outputs
1-1. Develop a phased and accelerated approach to more stringent codes and standards.	a) Adopt a progressive set of building codes, including one or two voluntary “reach” code tiers for residential and commercial sectors.	Building Codes Advocacy <ul style="list-style-type: none"> ➤ Continue advocacy and development of code enhancement proposals synchronized to support the CEC’s and DOE’s current and future proceedings. ➤ Participate in standards setting organizations outside California that impact T-24 building and T-20 or DOE appliance standards. ➤ Support product rating organizations that impact California standards ➤ Monitor and intervene, as appropriate, in state or federal legislation aimed at building and appliance efficiency. ➤ Identify new venues through which to influence building or appliance efficiency. ➤ Investigate new approaches to mitigating the federal preemption handicap on California’s ability to meet AB 32 objectives. ➤ Collaborate with the California Energy Commission, incentive program managers, ETP program managers, and local government partnership leads (and others, as necessary), to develop a limited number of standard “reach codes” that satisfy the majority of green and sustainable community needs and/or serve as a useful goal for incentive programs. 	<ul style="list-style-type: none"> ➤ Increasingly stringent codes and standards requirements. ➤ Progress toward successful CA exemptions from federal pre-emption. ➤ Regionally consistent reach codes developed
	b) Lower the renovation threshold at which the code applies to an entire existing structure	Building Codes Advocacy <ul style="list-style-type: none"> ➤ Conduct market research to establish application of codes relative to threshold “switches” followed by development of code proposals ➤ Work with CEC to redefine building materials as appliances, followed by T-20 proposals that affect renovations ➤ Conduct research and develop code enhancement proposals aimed at retro commissioning ➤ Conduct research relative to “trigger” events in existing buildings and develop code enhancement proposals 	<ul style="list-style-type: none"> ➤ Market research reports ➤ CASE Study proposals documenting cost-effective strategies targeting existing buildings

Codes and Standards

Strategic Plan Codes and Standards Goal	Strategic Plan Strategy	IOU Action Strategy	Outputs
	<p>c) Identify local code or ordinance opportunities as pilots or where local conditions may support accelerated action.</p>	<p>Building Codes Advocacy & Reach Codes</p> <ul style="list-style-type: none"> ➤ Collaborate with local government partnerships to develop pilot projects and/or reach codes, having first achieved agreements to: <ul style="list-style-type: none"> ▪ Work with the IOUs to attain robust compliance with existing T-24 building standards ▪ Limit proliferation of unique local codes, standardize to one of a couple standard reach codes absent unique local needs ➤ Develop a couple standard (rather than unique local codes) requirements at TOS or major renovations <ul style="list-style-type: none"> ▪ Investigate building compliance improvement into reach codes; for example ▪ Mandatory self-certified testing of building components (duct leakage, HVAC airflow etc, envelope tightness) ▪ Prescriptive baseline for HERS rating for 3d party verification 	<ul style="list-style-type: none"> ➤ Model codes for each climate zone targeting new construction and existing buildings at TOS available for LG adoption. ➤ Documented strategies to improve existing compliance rates
<p>1-2. Expand Titles 24 and 20 to address all significant energy end uses</p>	<p>a) Expand Title 20 to cover additional plug loads such as copy machines, printers, battery chargers, and televisions.</p>	<p>Appliance Standards Advocacy</p> <ul style="list-style-type: none"> ➤ Continue advocating and developing code enhancement proposals for plug loads in current and future proceedings; for example, PG&E is developing code enhancement proposals in 2009 proceedings for battery chargers, televisions, set top boxes, monitors, game consoles, etc. ➤ Expand CASE studies to include office equipment and other plug loads 	<ul style="list-style-type: none"> ➤ Title 20 CASE Proposals presented to CEC.
	<p>b) Enhance Title 24 to include whole building approaches including metering and data management; automated diagnostic systems; and sub-metering for tenant-occupied space.</p>	<p>Building Codes Advocacy</p> <ul style="list-style-type: none"> ➤ Pursue prescriptive requirements for fault detection and diagnostics ➤ Consider requirements for separate HVAC metering in large building ➤ Propose sub meters for all residential tenant spaces and nonresidential tenant spaces over ___ sf. (TBD) 	<p>Title 24 CASE Proposals presented to CEC.</p>
	<p>c) Pursue greater alignment of national and localized green building codes with energy codes.</p>	<p>Building Codes Advocacy & Reach Codes</p> <ul style="list-style-type: none"> ➤ Collaborate with the California Energy Commission, incentive program managers, and local government partnership leads (and others, as necessary) to develop a limited number of standard “reach codes” that satisfy the majority of green and sustainable community needs and/or serve as a useful goal for incentive programs ➤ Include green building codes and local government ordinances as inputs to development of standard reach codes ➤ Participate in the development of national building ratings LEED, ASHRAE 189, ResNet, Green Globes etc. 	<ul style="list-style-type: none"> ➤ Model codes, California Green Building Standards, and other similar standards developed as consistently as possible for local governments and other agencies pursuing enhanced efficiency efforts

Codes and Standards

Strategic Plan Codes and Standards Goal	Strategic Plan Strategy	IOU Action Strategy	Outputs
	d) Integrate AB-32 standards with energy-efficiency goals.	Building Codes and Appliance Standards Advocacy <ul style="list-style-type: none"> ➤ Continue development of a simple model to illustrate C&S impacts relative to AB-32 EE goals ➤ Estimate impacts of code proposals for current and future code cycles ➤ Adjust plans for 2011 and 2015 code cycles to meet AB-32 goals 	
1-3. Improve code research and analysis.	a) Analyze approaches for whole buildings, non-covered end uses and measures that are not currently credited by Title 24.	Building Codes Advocacy Consider for T-24 revisions: <ul style="list-style-type: none"> ➤ Compressor-less homes in coastal climates with minimum comfort standards ➤ Credit or base case for overhangs (passive solar, cooling load avoidance, glare reduction and mounting location) ➤ Minimum exhaust fan efficiency and minimum exhaust heat recovery ➤ Credit for cisterns, greywater use, etc. ➤ Gas line stub out for dryer in laundry room/area 	<ul style="list-style-type: none"> ➤ CASE Proposals for cost-effective technologies not currently in the Standards. ➤ List of potential CASE Proposals for future cycles.
	b) Conduct tests and evaluations of potential code change measures.	Building Codes and Appliance Standards Advocacy <ul style="list-style-type: none"> ➤ Conduct equipment testing and evaluations for measures associated with existing or future code proposals ➤ Build and track market share through voluntary programs targeting promising technologies ➤ Expand market intelligence and track market share through collection/acquisition of more comprehensive market data ➤ As necessary, develop test methods to support appliance standards or building standards 	<ul style="list-style-type: none"> ➤ Equipment performance data. ➤ New test methods where appropriate.
	c) Increase research and analysis regarding how behavior affects use of buildings and code compliance.	Building Codes Advocacy <ul style="list-style-type: none"> ➤ Conduct market research and analysis regarding how behavior affects use of buildings and code compliance; in particular, in support of specific code enhancement proposals ➤ Support development of periodic surveys to establish changes 	<ul style="list-style-type: none"> ➤ Research results that inform CE activities, outreach, and new code proposals.
	d) Evaluate and develop appropriate approaches to include DR standards in C&S.	Building Codes and Appliance Standards Advocacy Continue research and development of code enhancement proposals to make building systems DR capable; for example, PG&E successfully advocated DR capability in 2008 proceedings for: <ul style="list-style-type: none"> - retail lighting - sign lighting - ECMS systems with DDC to the zone <ul style="list-style-type: none"> ➤ Incorporate demand response into 2009 T-20 and future appliance standards proposals, as appropriate ➤ Adopt programmable communicating thermostats (PCTs) in 2011 if not already adopted ➤ Help assure DR works as intended by developing acceptance tests for the above T-24 measures, as well as PCTs 	<ul style="list-style-type: none"> ➤ 2011 and future code cycles continue to increase number of DR measures.

Codes and Standards

Strategic Plan Codes and Standards Goal	Strategic Plan Strategy	IOU Action Strategy	Outputs
	e) Continue exploration and adoption of improved building energy simulation and compliance tools.	Building Codes Advocacy ➤ Potentially support development of EnergyPlus or other advanced models as a building evaluation and compliance tool	Recommendations for improved energy simulation and compliance tools
1-4. Improve coordination of State energy codes and standards with other state and Federal regulations.	a) Continue to develop appliance standards to influence the market prior to preemption by DOE.	Appliance Standards Advocacy ➤ Continue to develop appliance standards to influence the market prior to preemption by DOE; for example, PG&E is developing more than a dozen code proposals for 2009 T-20 appliance standards proceedings ➤ Continue engagement in federal appliance standards updating proceedings and related standards negotiations with industry ➤ Support and engage in development of negotiated appliance standards through US legislative approaches (for example, EISA 2007) ➤ Continue aggressive support for new CA appliance standards in the current phase 2 and 2011 proceeding.	➤ CA is national leader informing DOE proceedings
	b) Coordinate Title 24 goals with 1992 Energy Policy Act requirements for meeting/exceeding Federal code.	Building Codes Advocacy ➤ Develop code proposals in support of CASE studies that exceed ASHRAE standards adopted by DOE.	Title 24 nonresidential standard that meets or exceeds the latest version of ASHRAE 90.1.
	c) Coordinate development and adoption of California Green Building Standards with Title 20/24 and ASHRAE Standard 189, CHPS.	Building Codes Advocacy & Reach Codes ➤ Coordinate with the Building Standards Commission and Housing and Community Development Agencies, in collaboration with the California Energy Commission, incentive program managers, and local government partnership leads (and others, as necessary) to develop a limited number of standard “reach codes” that satisfy the majority of green and sustainable community needs and/or serve as a useful goal for incentive programs.	Proposals for energy codes and reach codes that are coordinated and complementary to each other.

Codes and Standards

Strategic Plan Codes and Standards Goal	Strategic Plan Strategy	IOU Action Strategy	Outputs
	<p>d) Develop and implement plan for enhanced coordination and integration of codes and standards with full spectrum of EE market transformation, including Emerging Technologies promotion, deployment, incentives, consumer education, etc.</p>	<p>Building Codes and Appliance Standards Advocacy</p> <ul style="list-style-type: none"> ➤ Support the transfer of PIER deliverables directly to code proceedings, when appropriate ➤ Develop CASE studies for alternative calculation methods to establish T-24 credit for Emerging Technologies ➤ Collaborate with Mass Market and Targeted Market program leads to integrate program incentives with future codes ➤ Conduct long-term planning relative to future code cycles to establish voluntary program support needs, including: cost effectiveness, technical feasibility, and market readiness. ➤ Include green building codes and local government ordinances as inputs to development of standard reach codes ➤ Continue developing linkages with voluntary programs aimed at supporting implementation of existing standards; for example, coordination around nonresidential acceptance requirements ➤ Identify specific measures for future code cycles and coordinate support from incentive programs ➤ Continue engagement in federal appliance standards updating proceedings and related standards negotiations with industry ➤ Support and engage in development of negotiated appliance standards through US legislative approaches (for example, EISA 2007) 	
<p>1-5. Improve coordination of energy codes and standards with utility programs</p>	<p>a) Develop and implement plan for enhanced coordination and integration of codes and standards with full spectrum of EE market transformation, including Emerging Technologies promotion, deployment, incentives, consumer education, etc.</p>	<p>All Sub-programs:</p> <ul style="list-style-type: none"> ➤ Support the transfer of PIER deliverables directly to code proceedings, when appropriate ➤ Develop CASE studies for alternative calculation methods to establish T-24 credit for Emerging Technologies ➤ Collaborate with Mass Market and Targeted Market program leads to integrate program incentives with future codes ➤ Conduct long-term planning relative to future code cycles to establish voluntary program support needs, including: cost effectiveness, technical feasibility, and market readiness ➤ Include green building codes and local government ordinances as inputs to development of standard reach codes ➤ Continue developing linkages with voluntary programs aimed at supporting implementation of existing codes and standards; for example, coordination around nonresidential acceptance requirements <p>Identify specific measures for future code cycles and coordinate support from incentive programs</p>	<ul style="list-style-type: none"> ➤ Coordination plan, including objectives for each area of coordination

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Strategic Plan Codes and Standards Goal	Strategic Plan Strategy	IOU Action Strategy	Outputs
2-1. Improve code compliance and enforcement.	a) Conduct research to determine high-priority tactical solutions for code compliance and focus efforts accordingly.	<p>Compliance Enhancement: T24 Measure-Based & Holistic</p> <ul style="list-style-type: none"> ➤ Interview market actors in the building industry supply chain to determine how current performance compares to desired performance, the reasons for the gaps, and which performance improvement solutions the C&S Program may employ to improve energy code compliance ➤ Inventory existing Title 24 educational and support activities and identify best practices, gaps and opportunities to collaborate with industry experts ➤ Work with CALBO to conduct a survey of all building departments to determine special characteristics (availability of computers, inspector certification, 3d party plan checking or inspection etc.), resources, and training needs and preferences. ➤ Initiate a Compliance Improvement Process Pilot with several local governments including a needs assessment, and investigate permitting, inspection and workflow processes in detail ➤ Review existing HVAC and online permitting processes and tools 	<ul style="list-style-type: none"> ➤ Documented inventory of existing industry offerings, gaps, needs, and resources to inform CE strategies. ➤ Special characteristics (availability of computers, inspector certification, 3d party plan checking or inspection etc.) information related to building departments' resources, learning preferences, and training needs.

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Strategic Plan Codes and Standards Goal	Strategic Plan Strategy	IOU Action Strategy	Outputs
	<p>b) Increase training and support for local building code officials.</p>	<p>Compliance Enhancement: Title 24 Holistic</p> <ul style="list-style-type: none"> ➤ Develop and provide role-based training for local building code officials (plan checkers and building inspectors) ➤ Provide tools to streamline building official duties, such as dynamic checklists and targeted, streamlined manuals ➤ Implement Compliance Improvement Process Pilot in collaboration with approximately 12 Government Partnerships ➤ Identify opportunities to develop and test tools for process improvement and conduct outreach to encourage adoption of successful tools by other jurisdictions ➤ Work closely with the CEC and other providers to leverage all efforts and avoid duplication ➤ Work with CALBO to best match tools with building department needs ➤ Conduct outreach to encourage widespread use of online HVAC permitting ➤ Provide education on reach codes and Green Building Standards ➤ Potentially develop or support distribution of software support to track permits, required documentation, scheduling inspections and documenting inspection results, including HERS requirements ➤ Provide support for compliance software consistency review, and track HERS requirements and approval by HERS provider 	<ul style="list-style-type: none"> ➤ Robust Title 24 role-based training offerings. ➤ Documented typical building department processes, best practices, and specific barriers to improving compliance. ➤ Appropriate tools, in the right format for users, that increase enforcement efficiency, documentation tracking, and facilitate consistency across jurisdictions.
	<p>c) Investigate regulatory tools such as licensing/ registration enforcement.</p>	<p>Compliance Enhancement: T24 Holistic</p> <ul style="list-style-type: none"> ➤ Work with CABEC to develop a more stringent certification process for T-24 consultants ➤ Work with CEC to research options, costs, and benefits of developing T-24 consultant certification requirements ➤ Work with CSLB to educate members on code requirements and benefits to customers, and to encourage enforcement for licensed contractors. ➤ Work with CALBO to incorporate role-based energy standards training in their Education Week ➤ Work with HERS Providers to ensure data registry process and infrastructure are optimized 	<ul style="list-style-type: none"> ➤ Title 24 consultants with greater standards expertise, leading to improved compliance documentation submittals. ➤ Title 24 consultant certification process. ➤ Standard energy-efficiency training required for building department staff. ➤ Consistent, accurate, easy to use HERS data registry systems.

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Strategic Plan Codes and Standards Goal	Strategic Plan Strategy	IOU Action Strategy	Outputs
	<p>d) Evaluate proposed changes to the code and compliance approaches to simplify and expedite compliance.</p>	<p>Compliance Enhancement:</p> <ul style="list-style-type: none"> ➤ Streamline code and have three smaller codes: res, non-res & multi-family ➤ Evaluate where exceptions can be removed ➤ Pursue proactive registration of complying equipment and labeling requirements, perhaps through development of “CA Code Compliant” label for all appliances ➤ Separate short forms for retrofits-counter permit ➤ More mandatory less prescriptive requirements 	<ul style="list-style-type: none"> ➤ Role-based, abbreviated standards guidelines. ➤ HVAC equipment registration process
	<p>e) Work with local governments to improve code compliance, adopt above code ordinances, and provide training/education.</p>	<p>Compliance Enhancement: T24 Holistic & Reach Codes</p> <ul style="list-style-type: none"> ➤ Conduct Compliance Improvement Process Pilot to improve compliance (acknowledging local government limited resources) as discussed in 2.1 and 2.2. ➤ Provide education and training as discussed in 2.2 ➤ Work with Local Government Partnerships, CEC and other local government agencies to develop a small number of consistent, above-code ordinances for new construction and existing buildings ➤ Work with CEC to pre-approve codes for easy local government adoption, and encourage geographically contiguous local governments to adopt same reach codes ➤ Incorporate energy-efficiency stretch goals into green building standards, and work with the CEC, BSC and other stakeholders to make California’s Green Building Standard the desired local code level ➤ Encourage mayors and/or city councils to provide resources to building departments for energy-efficiency support ➤ Provide training on environmental and health benefit of energy code enforcement as a green, carbon reduction opportunity ➤ Provide “Circuit Rider” support (customized on-site training) upon request ➤ Interview cities on desired green building standard and features and work to insert common themes in California’s Green Building Standard, green building and reach forms, supporting documentation, software, tracking software and databases ➤ Investigate helping cities calculate cities’ carbon footprint and compliance index 	<ul style="list-style-type: none"> ➤ Regional reach codes that inform CA Green Building Standards updates. ➤ Long-term: California Green Building Standard becomes the desired green building code for local governments. ➤ Higher T24 compliance rates. ➤ Increased enforcement consistency across jurisdictions. ➤ Increased awareness of energy efficiency and Title 24 standards for local government leadership.

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See Section 8, Coordination & Integration, for details on how the C&S program will work with other programs within the energy-efficiency portfolio to help meet associated goals such as those defined for HVAC, local governments and workforce education and training.

f) Market Transformation Information

Market Transformation (MT) metrics proposed in Tables 4 and 5 are preliminary. The proposed metrics are meant to initiate a collaborative effort to elaborate meaningful metrics that will provide overall indicators of how markets as a whole are evolving. MT metrics should neither be used for short-term analyses nor for specific program analyses; rather, should focus on broad market segments.

Market transformation is embraced as an ideal end state resulting from the collective efforts of the energy efficiency field, but differing understandings of both the MT process and the successful end state have not yet converged. The CPUC defines the end state of MT as “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 further publicly-funded intervention is no longer appropriate in that specific market.”⁹ The Strategic Plan recognizes that process of transformation is harder to define than its end state, and that new programs are needed to support the continuous transformation of markets around successive generations of new technologies¹⁰.

Market transformation programs differ from resource acquisition programs on 1) objectives, 2) geographical and 3) temporal dimensions, 4) baselines, 5) performance metrics, 6) program delivery mechanisms, 7) target populations, 8) attribution of causal relationships, and 9) market structures¹¹. Markets are social institutions¹², and transformation requires the coordinated effort of many stakeholders at the national level, directed to not immediate energy savings but rather to intermediary steps such as changing behavior, attitudes, and market supply chains¹³ as well as changes to codes and standards. Resource acquisition programs rely upon the use of financial incentives, but concerns have been raised that these incentives distort true market price signals and may directly counter market transformation progress¹⁴. According to York¹⁵, “Market transformation is not likely to be achieved without significant,

⁹ California Public Utilities Commission Decision, D.98-04-063, Appendix A.

¹⁰ California Public Utilities Commission (2008) *California Long Term Energy Efficiency Strategic Plan*, p. 5. Available at <http://www.californiaenergyefficiency.com/docs/EEStrategicPlan.pdf>

¹¹ Pelozo, J., and York, D. (1999). “Market Transformation: A Guide for Program Developers.” Energy Center of Wisconsin. Available at: <http://www.ecw.org/ecwresults/189-1.pdf>

¹² Blumstein, C., Goldstone, S., & Lutzenhiser, L. (2001) “From technology transfer to market transformation”. Proceedings of the European Council for an Energy Efficient Economy Summer Study. Available at http://www.eceee.org/conference_proceedings/eceee/2001/Panel_2/p2_7/Paper/

¹³ Sebald, F. D., Fields, A., Skumatz, L., Feldman, S., Goldberg, M., Keating, K., Peters, J. (2001) *A Framework for Planning and Assessing Publicly Funded Energy Efficiency*. p. 6-4. Available at www.calmac.org.

¹⁴ Gibbs, M., and Townsend, J. (2000). The Role of Rebates in Market Transformation: Friend or Foe. In *Proceedings from 2000 Summer Study on Energy Efficiency in Buildings*.

¹⁵ York, D., (1999). “A Discussion and Critique of Market Transformation”, Energy Center of Wisconsin. Available at <http://www.ecw.org/ecwresults/186-1.pdf>.

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permanent increases in energy prices. From an economic perspective, there are 3 ways to achieve market transformation: (1) fundamental changes in behavior, (2) provide proper price signals, and (3) permanent subsidy.”

The question of what constitutes successful transformation is controversial because of a Catch-22: Market transformation is deemed successful when the changed market is self-sustaining, but that determination cannot be made until after program interventions are ended. Often, however, the need for immediate energy and demand savings or immediate carbon-emissions reductions will mean that program interventions may need to continue, which would interfere with the evaluation of whether MT is self-sustaining. Market transformation success has also been defined in terms of higher sales of efficient measures than would have otherwise occurred against a baseline absent of program interventions. The real world, however, provides no such control condition. Evaluators must estimate these baselines from quantitative factors such as past market sales that may be sparse and/or inaccurate - particularly for new products. Evaluations must also defer to expert judgments on what these baselines may have been as well as on the degree of successful market transformation¹⁶. Due to the subjective nature of these judgments, it is imperative that baselines as well as milestone MT targets be determined and agreed upon through collaborative discussion by all stakeholders, and these targets may need periodic revision as deemed necessary by changing context.

Market transformation draws heavily upon diffusion of innovation theory¹⁷, with the state of a market usually characterized by adoption rate plotted against time on the well-known S-shaped diffusion curve. In practice, however, the diffusion curve of products may span decades¹⁸. Market share tracking studies conducted 3, 5 or even 10 years after the start of an MT program may reveal only small market transformation effects¹⁹. The ability to make causal connections between these market transformation effects and any particular program’s activities fades with time, as markets continually change and other influences come into play.

These challenges mentioned above are in reference to programs that were specifically designed to achieve market transformation; and these challenges are only compounded for programs that were primarily designed to achieve energy and demand savings. However, since the inception of market transformation programs almost two decades ago, many lessons have been learned about what the characteristics of successful MT programs are. First and foremost, they need to be designed specifically to address market transformation. “The main reason that (most) programs do not accomplish lasting market effects is because they are not designed specifically to address this goal (often because of regulatory policy directions given to

¹⁶ Nadel, S., Thorne, J., Sachs, H., Prindle, B., and Elliot, R.N. (2003). “Market Transformation: Substantial Progress from a Decade of Work.” American Council for an Energy-Efficient Economy, Report Number A036. Available at: <http://www.aceee.org/pubs/a036full.pdf>

¹⁷ Rogers (1995) Diffusion of Innovations, 5th Ed.

¹⁸ Example in bottom chart of this graphic from the New York Times:
<http://www.nytimes.com/imagepages/2008/02/10/opinion/10op.graphic.ready.html>

¹⁹ Sebold et al (2001) p. 6-5,

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program designers.)²⁰ The Strategic Plan recognizes that regulatory policies are not yet in place to support the success of market transformation efforts²¹, but also reflects the CPUC's directive to design energy efficiency programs that can lay the groundwork for either market transformation success or for codes and standards changes.

Above all else, the hallmark of a successful market transformation program is in the coordination of efforts across many stakeholders. The most successful MT programs have involved multiple organizations, providing overlapping market interventions²². The Strategic Plan calls for coordination and collaboration throughout, and in that spirit the utilities look forward to working with the CPUC and all stakeholders to help achieve market transformation while meeting all the immediate energy, demand, and environmental needs. Drawing upon lessons learned from past MT efforts, the Energy Center of Wisconsin's guide for MT program developers²³ suggests that the first step is not to set end-point definitions, progress metrics or goals. Rather, the first steps include forming a collaborative of key participants. As the Strategic Plan suggests, these may include municipal utilities, local governments, industry and business leaders, and consumers. Then, with the collective expertise of the collaborative, we can define markets, characterize markets, measure baselines with better access to historical data, and define objectives, design strategies and tactics, implement and then evaluate programs. The collaborative will also provide insights that will set our collective expectations for the size of market effects we can expect, relative to the amount of resources we can devote to MT. No one organization in the collaborative will have all the requisite information and expertise for this huge effort. This truly needs to be a collaborative approach from the start.

The metrics and baselines described below in Tables 4 and 5 are presented for the purposes of starting the much-needed discussion between all key participants. These are suggestions, intended to allow key participants to pilot-test processes for establishing baseline metrics, tracking market transformation progress, and for refining evaluation tools. Early trial of these evaluation metrics will reveal any gaps in data tracking so that we may refine our processes before full-scale market transformation evaluations take place.

The set of metrics we selected is intentionally a small set, for several reasons. First, as mentioned, the full set of metrics and baselines need to be selected by key participants. Second, we anticipate that market share data for many mid- and low-impact measures will be too sparse to show MT effects and not cost-effective to analyze. Third, we selected core measures and metrics that would both be indicative of overall portfolio efforts. These measures are also likely to be offered on a broad

²⁰ Peters, J.S., Mast, B., Ignelzi, P., Megdal, L.M. (1998). *Market Effects Summary Study Final Report: Volume 1.* Available at <http://calmac.org/publications/19981215CAD0001ME.PDF>.

²¹ CPUC (2008) Strategic Plan, p. 5.

²² Nadel, Thorne, Saches, Prindle & Elliot (2003).

²³ Peloza & York, (1999).

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level by other utilities, providing a greater base of sales and customer data that could be analyzed for far-reaching MT effects.

More specifically, for the Codes and Standards program the approach to market transformation follows a path through regulation and adoption in which IOUs are one of many stakeholders. Regulation through building codes and appliance standards comprises an exit strategy for traditional portfolio activities and creates a continuous improvement cycle in California. While voluntary programs are essential to establishing market acceptance, adoption into code is required to complete the market transformation process.

Adoption into code is a commoditization process, which converts a once high-margin differentiated product into an industry commodity or baseline product. Greater economies of scale for the once premium product reduce the cost of the regulated product which, in turn, drives innovation for new products that can be sold at high margins.

In California, the CEC is responsible for conducting rulemakings, including setting the scope of proceedings, determining the schedule and either adopting (with or without modifications) or rejecting a code proposal. Hence, the CEC largely determines the success or failure of the CPUC's IOU-administered C&S program.

Since the emphasis on C&S program opportunities is still comparatively new, some C&S program-related CPUC policies are not fully developed, which creates uncertainty for C&S program implementation. Additionally, if the CPUC is unable to conduct timely baselines and evaluations, the delay may constrain or delay C&S program activities.

From a C&S program perspective, the IOU's role is somewhat limited, including developing code proposals through the building codes and appliance standards advocacy sub-programs and supporting the public process through adoption. Since the CEC controls the timing of all aspects of the adoption process, advocacy entries in Table 4 are general and subject to change.

Table 4

	Baseline Metric		
	Metric A	Metric B	Metric C
Codes & Appliance Standards Advocacy (EOA)	Target compliance levels for a collection of indicator measures. An example list of measures may include: residential hardwired lighting, residential duct		

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	improvement, ducts in existing commercial buildings, pool pumps, general service incandescent lamps, external power supplies, and other measures as appropriate		
Model Reach Codes		Community adoption of new construction model reach codes as developed by the Codes and Standards programs	
Compliance Enhancement (Title 24)			Number of energy consultants, plan checkers and field inspectors who pass the new Certified Energy Plans Examiner test, adjusted by market size

Through the extension of advocacy components of the building codes and appliance standards advocacy sub-programs, IOUs will strive to improve compliance rates with the measures as noted below.

In 2009, the IOUs will develop a detailed statewide compliance enhancement plan and goals based on the program's compliance enhancement scoping study results. This plan will include program targets for compliance based, in part, on the CADMUS evaluation ongoing at the time of this writing. In 2010, the IOUs will assess the program's progress relative to the compliance enhancement plan goals, revise the plan and improve CE sub-program implementation as necessary. Again in 2011, the IOUs will assess the program's progress relative to the plan goals, revise the plan and improve program implementation as necessary.

g) Quantitative Program Objectives

As stated above, market transformation draws heavily upon diffusion of innovation theory, with the state of a market characterized by adoption rate plotted against time on the well-known S-shaped diffusion curve. In practice, however, the diffusion curve of products may span decades. Market share tracking studies conducted 3, 5 or even 10 years after the start of an MT program may reveal only small market transformation effects. Therefore it is problematic, if not impractical, to offer internal

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annual milestones towards market transformation sectors and specific program activities.

As a consequence, it is not appropriate to offer more than broad and general projections. Any targets provided in the following table are nothing more than best guesstimates, and are subject to the effects of many factors outside the control of program implementers.

Table 5

	Internal Market Transformation Planning Estimates		
	2009	2010	2011
Target compliance levels for a collection of indicator measures. An example list of measures may include: residential hardwired lighting, residential duct improvement, ducts in existing commercial buildings, pool pumps, general service incandescent lamps, external power supplies, and other measures as appropriate	Develop baseline based on the CPUC/CADMUS study	Improvement over baseline, over time	Improvement over baseline, over time
Community adoption of new construction model reach codes as developed by the Codes and Standards programs	Develop residential and nonresidential model reach codes for each climate zone	Improvement over baseline, over time	Improvement over baseline, over time
Number of energy consultants, plan checkers and field inspectors who pass the new Certified Energy Plans Examiner test, adjusted by market size	Improvement over baseline, over time	Improvement over baseline, over time	Improvement over baseline, over time

7. List of Measures & CASE Studies

a) Provide a list of measures and Codes and Standards Enhancement (CASE) studies.

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One item to note is that CASE studies are not completed until after adoption and any references to the number of CASE studies within this PIP are simply best estimates. For several reasons, the number of CASE studies may be revised during the course of program cycle. These reasons include:

- The number of proposed CASE studies may not match the number of adopted CASE studies due to lack of availability of products in the market, excessive industry opposition, measures are not yet ready for the 2011 code cycle, compliance models are not able to adequately model the energy savings, etc.;
- During the development of a CASE study proposal, it may be determined that a measure is not a good candidate or is not ready for the codes and may be dropped or postponed to another code cycle;
- Many of the CASE studies listed in Table 6 may be co-funded by more than one IOU. The level of joint participation and co-funding will be determined as the CASE studies are more fully investigated;
- RFPs are still to be issued for many of the CASE study projects. Therefore the exact funding requirements are not yet known and the number of CASE studies that can be completed within the IOU budgets cannot be precisely determined;
- Certain groups of CASE study proposals to be combined. For example, some of the various daylighting CASE studies may be combined into a single CASE study.
- If time and resources permit, additional CASE study proposals may be added; and
- Actual courses to be developed and number of courses to be delivered by the IOUs under the CE sub-program will be determined after the scoping study is complete.

Following are tables of current and future IOU CASE study topics. For a number of reasons, these lists are not static. After further planning, IOUs may decide to swap leads, co-fund, or make other changes, as appropriate. During the CASE study development process, it is sometimes found that there is insufficient market data or economic information to justify a standard. During rulemakings, industry representatives may inject sufficient uncertainty to derail a proposal. The CEC may indicate that they are more interested in some proposals and delay others. Sometimes new ideas occur that were overlooked during the planning process.

The CASE study projects develop feasibility and cost-effectiveness evaluation for a variety of code improvement opportunities. These CASE projects are not a purely technical exercise, advocacy is an important part of moving an idea into energy codes and this requires a significant amount of consensus building and negotiation.

Table 6 includes measures to be evaluated for the 2011 Title 24 Building Efficiency Standards. The IOU lead provides funding, is the project manager for the CASE report, is responsible for tracking project progress, and is involved with some of the policy questions that arise in the development and advocacy of the CASE measure. Co-funding typically indicates another IOU which is interested in the topic and will likely provide in-kind support, as well as financial support of the CASE report, but is not managing the consultant working on the CASE report. Research support often

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comes in the form of utility test labs, or field data collected by ET or other programs. The status indicates whether a contract has been let (“initiated”), research has commenced (“ongoing”), or in the case when this field is blank, the measure is in an RFP that has not yet been issued.

Table 6: Building Codes and Appliance Standards

Measure	Description	Status
Non-Residential		
<i>Envelope</i>		
Glazing	The nonresidential SHGC requirements have last been updated in 1998, since that time new glazing products have been developed and the incremental costs of low-e coatings may have changed. The SHGC requirements need to be revisited to optimize energy savings from windows.	New
	Currently, window solar heat gains are based on normal incidence measurements. However, sunlight rarely is at normal incidence except early in the morning and late in the afternoon. A SHGC metric that accounts for the amount of heat gain over the entire day provides a better signal to designers. The 2008 overall envelope method makes use of a combination of SHGC and VLT ratings as a proxy for the time integrated solar heat gain for various window selections. A similar type of requirement is desirable for prescriptive glazing requirements. Daylighting requirements by windows are expanding - proposed SHGC requirements shall consider their impact with and without daylighting controls.	
Envelope /daylighting	Title 24 currently gives credit to overhangs for their ability to reduce solar heat gains. However overhangs can decrease glare from daylight on non-North exposures and when used as an exterior light shelf can expand the depth of usable daylight. The credit for overhangs shall be increased to account for the likelihood that blinds are not closed to reduce glare. At the very least the DOE-2 glare methodology can be used to estimate the benefit from overhangs however improved methods or metrics can be used.	Initiated
Sidelighting	Develop requirements for windows that result in minimum areas that must be daylit and minimum effective apertures of the daylit area or some other daylight metric. Also update the minimum area threshold and other photo control requirements. Add requirements that improve lighting quality or reduce glare. Develop ACM language that defines the application of these metrics in the Performance Method, and establish the standards for compliance tools to produce these metrics	Ongoing
Skylighting	New prescriptive requirements for skylights based on stakeholder interviews, cost-effectiveness analysis and on daylight metrics. New ACM modeling methods with new daylighting metrics baseline and including daylight controlled louvers under skylights	Ongoing
Skylighting requirement	Section 143c requires that 50% of the floor area be in the "skylit zone" for large open spaces. Revise the fraction of area that must be in the skylit zone based on compliance (forms and field) study that identifies what fraction of the floor area is in the skylit zone for various applications.	New
Skylighting exemptions	Section 143c requires that half of the floor area be in the "skylit zone" for large open spaces. An exemption is provided for spaces where the designed general lighting LPD is less than 0.5 W/sf. If this exemption were eliminated, the requirement would be easier to enforce. If this exemption were limited to lower LPDs, the savings from skylighting would increase. An evaluation of the cost-effectiveness and feasibility of spaces where the exemption applies shall inform a proposal to modify or remove this exemption.	New
HVAC		
Economizers - performance ratings	The PIER small commercial rooftop survey found that around 65% of economizers on small rooftops had failed. New economizers should have to meet specific performance standards for damper cycles, damper leakage, sensor calibration and functional performance.	New

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Economizers - required on small RTU	Currently economizers are required on air conditions with capacities greater than 75,000 Btu/hr. Update the requirements to cover all sizes of equipment where the control is cost-effective. This control would require that economizers are combined with 2 stages of electronic thermostats so that on economizers can provide partial cooling by cycling. This measure would require an updated acceptance tests that requires a two-stage or electronic thermostat and verifies that the economizer can provide full economizing and partial economizing.	New
EER baseline	Review the rationale behind the assertion that EER 10 must be the basis of complying with revised Federal SEER 13 requirements for air conditioners. Measure review also includes review of pre-emption, review of ARI and CEC air conditioner efficiency databases and PG&E documents and surveys of EER values for small central air conditioners in the California market.	New
Evaporative cooling baseline	Identify the feasibility and cost-effectiveness of evaporative pre-cooling, or evaporative condensing for nonresidential buildings. Identify the barriers or opportunities for establishing evaporative cooling as the default prescriptive base case for new nonresidential buildings.	New
ARI fan rating higher SP	Identify the possibility of updating the air conditioners testing standard so that more realistic static pressures are used for rating air conditioners. Develop a proposed test procedure and take this procedure through the standards development process with ASHRAE and ARI	New
DR (PCTs) on all AC	Demand responsive controls are required for DDC to the zone air conditioning systems. Pursue code changes that require PCTs on single zone systems and also Demand responsive controls for VAV systems that do not have DDC to the zone.	New
Variable speed single zone	Identify the smallest size air conditioner where variable speed control is feasible for a single zone system.	New
Large AC	Identify the smallest size air conditioner where evaporative condensing is cost-effective when considering the total cost of ownership including first cost, operating cost and maintenance cost. Identify the feasibility market share and other barriers associated with this technology. Identify the water usage, water treatment and other issues associated with this technology.	New
Radiant cooling	Update ACM to model radiant cooling. Consider radiant cooling as the base case HVAC system for applications where energy consumption is reduced cost-effectively. Identify market and feasibility barriers to wider use of radiant cooling and heating. Develop prescriptive and performance requirements for radiant cooling and heating.	New
FDD	Require fault detection and diagnostics for large HVAC systems. Develop a standard for common fault message messages.	New
Occupancy sensing HVAC control	Investigate the feasibility and cost-effectiveness of occupant responsive HVAC. Occupancy sensors are required to control lighting in the following spaces: Offices 250 square feet or smaller; multipurpose rooms of less than 1000 square feet and classrooms and conference rooms of any size (Section 131(d) 4). Document the feasibility and cost-effectiveness of setting up thermostats or reducing to minimum VAV boxes when zones are unoccupied. Identify other spaces that should also be considered for occupancy control.	New
Ventilation	Identify the optimal outside air amounts that include health, productivity and energy impacts of amounts of outside air. Identify if the outside air amounts should be integrated over time and whether minimum outside air amounts could be lower following periods of 100% outside air due to airside economizer operation.	New
Ducts	The solar reflective index (SRI) of galvanized ducts is low due to the low emissivity of metal ducts. Document the feasibility and cost-effectiveness of requiring "cool" surfaces or coatings for exterior ductwork.	New
Outside air	Acceptance tests for minimum outside air quantities include methods that are rife with error. Develop easy to use, reliable methods for measuring outside air quantities and propose changes to the outside air acceptance testing method (Standards Nonresidential Appendix NA 7.5.1).	New

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Eliminate reheat	Traditional single duct VAV systems may have core zones that require cooling provided throughout the year, this cold air is then heated in the perimeter zones during the winter months. Evaluate the feasibility cost-effectiveness of alternatives to reheat VAV systems (dual duct, 4 pipe fan coil, dedicated ventilation with radiant etc.)	New
Standby losses	Air conditioners and furnaces have two standby losses. Air conditioners have crankcase heaters that protect the compressor by making sure that the oil temperature is warm enough before operating the refrigerant compressor. Significant savings can be obtained by having a control that heats the crankcase oil only when the oil is below a given temperature and only prior to operation of the refrigerant compressor (lock-out until oil is up to temperature.) Similarly furnaces have standing pilot lights that are only needed for just prior to igniting gas for heating. An electronic ignition ignites the pilot light only just before igniting the main flame for providing heating. Evaluation of the feasibility and cost-effectiveness of this measure first requires an evaluation of whether this measure is preempted by Federal appliance efficiency standards.	New
Pre-Cooling	Evaluate a code requirement based on a pre-cooling strategy that pre-cools a building at night, storing the cooling in the building thermal mass and reducing cooling loads during the peak periods. This should result in both on peak energy savings and demand.	New
HVAC zoning	Identify a maximum size of a thermal zone (covered by one thermostat or one zone sensor) in office occupancies. Evaluate the energy and cost impacts of this requirement.	New
Outdoor air pretreatment / Dedicated outdoor air systems	Identify applications where a dedicated outside air system is cost justified on a life cycle basis	New
Ductless systems	Evaluate the feasibility of requiring ductless systems based on lower duct losses, lower fan energy and smaller thermal zones (e.g. variable refrigerant flow systems)	New
Lighting		
Task/ambient	Revise indoor lighting power densities (LPD) W/sf based on best available information on acceptable levels of ambient (general) lighting used in conjunction with furniture mounted or plug connected task lighting. Such an evaluation will include evaluating recent research on task/ambient lighting systems and the recommendations of the appropriate IESNA technical committees.	Ongoing
Control devices for workplace luminaires	Simplified daylighting control – low cost daylight controls that make use of human factors (e.g. sentry switch located on daylit wall).	New
Tailored method (retail)	The primary use of the tailored lighting method is to support higher lighting power densities in retail environments where incandescent display lighting is extensively used or very high light levels are desired. Whole building and space-by-space method approaches allow approximately half as much lighting power. Though it has been simplified, the tailored lighting method is complex to use and harder to enforce than the whole building or space-by-space compliance methods. The Washington State energy code only allows a simple space by space method for lighting power allowances and retail lighting is limited to 1.5 W/sf general lighting allowance and a 1.5 W/sf display allowance. Evaluate whether the Washington State retail lighting requirements are appropriate for Title 24. Propose an improved compliance method for retail lighting and other occupancies that make use of the tailored lighting method. A fall back proposal may not allow tailored lighting for the performance approach.	New
Adaptation compensation	When outdoor light levels are high, occupants desire higher light levels indoors to compensate for the adaptation level of the eye when coming in from outdoors. Title 24 currently has requirements for skylighting in large spaces with high ceilings. The light from skylights is providing the compensation light levels on bright days. Thus, the design installed lighting power density in skylit spaces can be reduced to that needed for nighttime use. Evaluate the feasibility, energy savings and cost-effectiveness of reducing lighting LPDs in large open spaces.	New

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Photocontrols	The RightLight Consortium (www.rightlight.org) found that office occupants are more satisfied when they control light levels and that on average they choose light levels lower than common lighting standards. Providing unlimited amount of adjustment downwards and some allowance for adjusting set points upwards on photocontrol dimmed systems may save energy and increase reliability of the savings. Evaluate the energy savings, feasibility and cost-effectiveness of this concept. If the outcome is positive, propose a Title 24 code change measure that would be easy to enforce and result in greater energy savings.	New
Individual lighting control	Substantial amounts of energy savings are possible if lighting is more closely controlled by occupants in open plan offices. One example of this is illustrated in http://www.aceee.org/conf/06et/ST5_Huizenga.pdf where wireless controls enable individual user control of lights. This measure overlaps with measures to lower ambient light levels the lower ambient light levels are the less need for individual control of overhead lighting. Evaluate this measure as an alternative to very low ambient light levels and the trade-offs and feasibility issues.	New
Retrofit Requirements	Evaluate the issues associated with lighting retrofits, (TI, gut remodels, replacing fixtures etc) and propose more stringent requirements for updating lighting system so that it complies with 2011 LPDs and fluorescent lighting complies with Fed appliance regulations. Also consider the trigger events for controls upgrades - this evaluation should consider the costs/benefits of wireless controls for these upgrades. Evaluate the cost-effectiveness and feasibility of all of these requirements.	New
DR controls	Develop and test and refine acceptance tests for DR (demand responsive) lighting controls. The 2008 Title 24 standards require DR controls for retail lighting in stores > 50,000 sf. These tests have to be generic enough to be compatible with all of the DR systems planned for California's IOU's and municipal utilities while at the same time being specific enough to verify that the DR control is configured to turn off the appropriate number of lights or dim lights to the appropriate level. The tests will be easy to understand and perform, easy to document, inexpensive to perform and cost-effective.	New
Occupancy Controls	One of the key objectives of retail lighting is to attract the shopper's attention in a way that is pleasurable. The method of attracting shopper's attention is the use of highlighting - lighting an object 10 times or more than its surroundings. By darkening the surround until the occupant draws closer - occupancy sensors can make a display stand out, while using less energy than previously possible. Humans are also hardwired to respond to change including changing illumination - thus changing light levels triggered by occupancy sensing can attract attention based on temporal changes in light level and not just the spatial; changes in the traditional highlighting of objects. This evaluation will work with retailers and their designers to investigate the opportunities to use occupancy sensing in retail environments, evaluate the energy savings, feasibility and cost-effectiveness. The desired outcome is a calculated power adjustment factor for occupancy sensing controls and a reduced default retail lighting power density. Current work includes the use of occupancy sensing control of refrigerated display lighting in Wal-Mart supermarkets.	New
Hotel Guest Room Control	To reduce hotel/motel lighting and HVAC energy use, several products are coming to market that minimize usage during unoccupied periods through the use of the key card. Key card systems have become universal in the hospitality industry due to the benefits of increased room security through reprogrammable key cards. Energy management features that control room HVAC, lighting operation and plug loads represent the next logical step in key card evolution.	Ongoing
Bi Level Lighting Controls	Lights in warehouse stack areas are typically on during normal working hours. Since a majority of these spaces are unoccupied during normal working hours, these areas would benefit from lower light levels. Automated bi-level lighting controls will save energy and based on occupancy would also reduce demand.	Ongoing

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Bi Level Lighting Controls	Hallways in Hotels/Motels are typically lit twenty four hours a day. Automated bi-level lighting controls shall reduce lighting power during unoccupied periods in the hallways. Automated bi-level lighting controls will save energy and based on occupancy would also reduce demand.	Ongoing
Dimming Ballasts	Determine whether dimming ballasts should be required for all nonresidential light systems. Study to also look at potential energy savings, cost-effectiveness, compliance issues, control interfaces, and exceptions.	Ongoing
Lighting energy density	Revise Title 24 lighting standards from W/sf to kWh/sf (not a good idea for enforcement)	Ongoing
Outdoor Lighting		
Security lighting	After the terrorist attacks in 2001, the IESNA hurried to print IESNA G1-2003, "Guideline on Security Lighting for People, Property, and Public Spaces" these guidelines called for light levels that were 3 times higher than normal outdoor lighting levels. Where these higher levels of lighting were required was poorly defined. As a result, the 2005 and 2008 outdoor lighting requirements have higher W/sf for retail parking lots. The appropriate light levels and allowable wattage densities need to be revisited and a revised energy standard proposed.	New
Outdoor lighting	The model lighting ordinance (MLO) was jointly developed by the Illuminating Engineering Society and the International Dark Sky Association. The MLO may result in lower allowable outdoor lighting wattages than the 2008 Title 24 standard. If this is the case, it would be desirable to update T-24 with the MLO values. An evaluation of the feasibility, protection of public safety and cost-effectiveness of this coordination between the MLO and Title 24 is needed to provide the technical background for this potential code change.	New
LED Induction light sources	An SCE ET study identified that one can light car sales lots with half as much power and 2/3's the peak light levels with induction lighting as compared tot Metal halide lighting. In addition it is easier to control the light output of induction lighting that HID sources. To bring this measure into the Title 24 code requires acceptance by the lighting community that lower light levels provide equal satisfaction. <i>Induction Lighting Demonstration and Survey for Car Dealerships Exterior Display Lighting</i> http://www.rlw.com/pubs/Induction_Lighting_Report_v7_12-08-06.pdf	New
Bi-level motion sensor controls	Most of the hours of the year, parking lot lighting is providing full light output while there is no activity close by. Controlling parking lot lighting with motion sensors by dimming lights to half or 1/3 light levels when there is no motion and returning the lighting to full light output can cut lighting consumption substantially.	New
Street lighting	Develop street lighting standards that can be used by local governments and utilities to provide appropriate lighting conditions while minimizing energy consumption.	New
Outdoor lighting recommendations	Based on a symposium to be held with key stakeholders	Ongoing
Sign Lighting		
High frequency ballasts	Identify the availability of high temperature high frequency ballasts for use in illuminated signs. Update technology requirements and sign W/sf based on availability of high frequency ballasts for neon, fluorescent, and cold cathode light sources.	New
Performance standard	The current Title 24 sign wattage requirements are either a W/sf of sign or specific light source efficacy requirements. Both the wattage density and the technology requirements should be updated to reflect best economically available sign illumination technology.	New
Refrigeration Plant - Supermarkets, for example		
Floating head controls	Floating head controls allow compressor head pressure to float in response to ambient temperatures. This requires a more sophisticated control of condenser fan speed or fan cycling. Savings are determined by how low condensing pressure can go which is determined by compressor design and oil management systems. Thus, this measure would consider the costs and savings associated with design of equipment to handle low condensing temperatures and condenser fan speed control.	New

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Condenser efficiency	Minimizing refrigerant head helps reduce refrigeration energy consumption. Increasing the heat transfer capacity of condensers is one way to reduce refrigerant head. This measure would consider setting a design temperature differential between design ambient air temperature and condensing pressure. In Section 126 of the 2008 Title 24 standards, condensers serving refrigerated warehouses have temperature differential (condenser sizing) requirements.	New
Condenser fan	Identify the minimum systems size where speed controls make sense from a feasibility and cost effectiveness basis. Identify the appropriate control strategy for controlling speed. Identify minimum motor efficiency or technology (i.e. ECM) for various motor sizes.	New
Compressor efficiency	Currently refrigerant compressors do not have a test method or rating protocol. Thus, currently there is not a rating to easily compare the relative efficiency of refrigerant compressors. This requires a test standard and then a rating and labeling requirement.	New
Part load system efficiency	Controls that match refrigerant flow to load vary from compressor cycling, unloading controls to variable speed compressors. Most refrigeration systems operate at part load most of the time. Thus, part load efficiency is an important determinant of refrigerant energy consumption.	New
GHG Performance Standard for Supermarkets	Provide technical support to CEC and CARB to develop a performance standard within Title 24 for specific building types with large refrigeration systems that will consider both energy efficiency and the potential for refrigerant leakage using the same GHG emission metric. Technical work to be completed includes (1) establishing baselines for the energy and refrigerant use of refrigeration systems, as well as the other energy systems in Supermarkets; (2) evaluating and if necessary improving simulation models for refrigeration systems; (3) determining the most appropriate set of metrics to include in the performance standard; (4) developing specific technology recommendations to comply with the proposed standard.	Ongoing
Acceptance tests	Develop acceptance tests that identify when equipment controls are not working according to the intent of the T-24 standards. This would include floating head controls, condenser VSD controls, compressor staging or other part load controls etc. Also consider acceptance tests for VSD evaporator fans which would likely be required by Title 20. These acceptance tests will be quick to perform and provide a reliable indication of whether controls are working correctly.	Ongoing
Refrigerated warehouses		
Acceptance tests	Develop acceptance tests that identify when equipment controls are not working according to the intent of the T-24 standards. This would include floating head controls, condenser VSD controls, part load controls, and evaporator fan VSD controls. Identify the feasibility, cost-effectiveness, need for new tools or skills and the time needed to conduct the tests. Identify if systems require any design changes for quickly administering the tests.	New
Part load control	Develop a proposal that would require part load efficiency comparable to VSD control. Identify the minimum compressor hp this proposal could apply cost-effectively. Identify different methods of part load control and the relative benefits of various control strategies.	New
Evaporator fan efficiency	Research the feasibility and cost-effectiveness of an evaporator fan efficiency standard.	New
Condenser fan efficiency	The 2008 Title 24 refrigerated warehouse standard has a requirement based on temperature differential between design ambient temperature and design condensing temperature. However, this can be accomplished by blowing a lot of air through the condenser. This requirement would control the other half of condenser efficiency by simultaneously placing a limitation on W/Btu rating of the condenser. This would encourage a balance between condenser size, motor efficiency and fan efficiency.	New
Refrigerated truck cooling	Overhangs can reduce the cooling loads of trucks while they are being loaded or unloaded at a truck dock. Receptacles for truck air conditioning would allow trucks to turn off the generators for on-board refrigeration. This has a global and local environmental benefit.	New

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Process loads		
Computer rooms	Consider a range of efficiency measures associated with server rooms: higher EER cooling sources, wider range of relative humidity allowed, networked cooling controls so systems are not fighting each other etc. Evaluate the feasibility of incorporating the standards developed by ASHRAE TC 9.9 for ASHRAE 90.1	New
Fume hoods	Fume hoods with sashes that maintain laminar flow and have VSD on main fan that is maintaining a constant duct pressure. Also consider option of sashes that close based on occupancy sensing in front of fume hood.	New
Kitchen exhausts	Kitchen exhausts that are able to reduce speed based on temperature or other best practice metric.	New
Kitchen exhausts	Filtration can be clogged quickly on kitchen hoods and reduce system efficiency. Consider benefit of pressure sensing across filters and having this displayed near point of use.	New
Boiler-O2 trim control	Similar to the Oxygen Sensors in cars that optimize the air/fuel ratio, Oxygen trim controllers in gas boilers optimize the combustion efficiency of the boiler. This study would identify the boiler size at which O2 trim control is cost-effective. The hours of operation for this analysis should be considering the hours for a large DHW boiler, space heating boiler and industrial process boiler.	New
Cooling towers	Currently Title 24 Section 112 has a minimum gpm per hp requirement for heat rejection equipment (cooling towers, evaporative condensers and air-cooled stand-alone condensers. For industrial applications the requirements can be more stringent as the operating hours are longer. Identify a more stringent requirement for industrial loads that is cost-effective and feasible.	New
Compressed air staging control	Screw compressors operate at a significant fraction of full load power when they are unloaded. This proposal would identify appropriate system sizing and staging guidelines so that compressed air systems are operating efficiently during part load conditions. These design guidelines would be codified into simple requirements for compressed air systems.	New
Escalator Occupancy Controls	Escalators installed in the U.S. use a considerable amount of energy due to continuous operation and the large motors used to drive the escalators. Escalator controls save energy due to reduced operating hours of the escalator and based on occupancy patterns would also reduce demand. Occupancy controls that reduce the speed or shut down escalators when no one is nearby.	Ongoing
Plug loads	In office and retail buildings.	New
Non-Res and High-rise Res DHW		
Solar pool heating	Solar pool heating can displace gas or electric heating cost-effectively. Unglazed solar water heating panels are inexpensive and can make use of the pool filtration pumping system to move the water through the panels. However many pools are not heated and others are heated for a small time of the year. Thus, it is likely that there are climatic and applications and pool sizes that solar pool heating is very cost-effective and feasible. Identify under which conditions solar pool heating is cost-effective and applicable.	New
Solar DHW heating	The unit cost of electricity is approximately 4 times higher than the cost of natural gas. Solar water heaters are cost-effective when they are displacing electric water heating for domestic hot water and for electrically heated spas. Identify the conditions that these systems are cost-effective. Identify which components are needed to assure that the solar system will have adequate longevity.	New
Water heating boilers-forced draft or flue damper	Almost half of the losses in natural draft water heating boilers are due to standing losses. Much of this loss is due to air flowing through the combustion and heat exchanger passages in the water heater when it is not firing. Flue dampers can be interlocked with the gas valve so that the damper closes and inhibits airflow through the heat transfer surfaces when the burner has cycled off. Compare the life cycle energy savings of this measure to the added first costs of adding the flue damper. Consider the cost of systems where the flue damper is incorporated into the boiler.	New

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Recirc pump	Many multi-family buildings have central DHW systems. A significant fraction of the energy consumption by these systems is serving heat losses from the recirculation loop between the water heater and the piping for the dwelling units. Pump controls can minimize these heat losses. Identify the system sizes and types where these controls are cost-effective. Develop a performance model for these controls so the controls can be simulated in the ACM.	Ongoing
Single Lever Water Faucets	Determine cost effective energy savings code improvement opportunities to prevent crossover flow in recirculation systems could be in multifamily homes with central distribution system or in residences with demand control or re-circulating systems single lever water faucets for domestic applications.	Initiated
Individual water heaters	Sealed combustion water heaters typically are forced draft and many may be condensing and higher efficiency. Sealed combustion water heaters have the added value that there is virtually no opportunity for back drafting combustion products into the occupied space. Thus, this measure would have the dual benefit of higher efficiency and in some cases improved indoor air quality. Also conditioned space air is not used for combustion so this places less of an infiltration load on the dwelling unit.	New
Smaller pipe diameter	With smaller diameter pipes, less water is expelled before hot water is received at plumbing fixtures. When water is warm that is sitting in the pipe this results in energy savings and in all cases this reduces wastage of water. Even for cold water this saves water as sometimes people clear the lines waiting for cold water to emerge from the faucet for drinking. Since 1990 EPACK, a number of plumbing fixtures have reduced water consumption. Updating the Uniform Plumbing Code is long overdue and can save energy and water. This would require working with the appropriate IAPMO committee and providing technical support that reducing pipe diameters would not cause excessive pressure drop while providing important benefits.	New
Storage water heaters - forced draft or flue damper	Almost half of the losses in natural draft storage tank water heaters are due to standing losses. Much of this loss is due to air flowing through the combustion and heat exchanger passages in the water heater when it is not firing. Flue dampers can be interlocked with the gas valve, so that the damper closes and inhibits airflow through the heat transfer surfaces when the burner has cycled off. Evaluate whether this measure is preempted by Federal water heater regulations or if this can be considered as an efficiency add-on that is not pre-empted. Compare the life cycle energy savings of this measure to the added first costs of adding the flue damper. Consider the cost of systems where the flue damper is incorporated into the water heater.	New
Power and Electrical Distribution		
Plug in hybrid bays	Plug-in hybrids may be a big part of our energy future. Plug in hybrids could be providing significant improvements to air quality, the efficiency of car transportation and may provide a large battery to draw power during times of system peak. Evaluate the costs and the lost opportunity presented by pre-installing conduit to all garage parking spaces. This analysis would consider the likely probability of plug in hybrid market share. This evaluation needs to account for the societal cost of local gasoline combustion versus remote electricity generation, and the trade-off between the value of local emissions and depleting battery storage during peak periods.	New
Power quality and power factor	Reducing harmonics and increasing power factor reduces losses in the electrical system. This measure would consider the feasibility and cost-effectiveness of requiring that all permanently installed devices in buildings have high power factor, low harmonics and low RFI. Exceptions would have to be crafted for broad categories of equipment (small size?) that are not cost-effective to require better electrical power quality performance.	New
Standby power	Residential homes having a time clock control that can turn off all non-essential, non-lighting plug circuits could eliminate stand-by load losses for a significant number of hours. This control would be easily user adjustable and have at least 4 periods per day 7 days per week.	New
Residential		
Envelope		

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Window SHGC	Prescriptively require lower SHGC windows in residential occupancies that account for double low e materials. The requirement shall be crafted to assure the lower SHGC requirement has a net benefit TDV savings (i.e. lower SHGC may not be desirable in coastal climate zones). Identify aesthetic, comfort, feasibility, and cost-effectiveness of such a proposal.	New
Window area based on WWR	Adding windows increases first cost and increases HVAC loads. However windows are a desired amenity. This amenity is to provide a certain level of transparency to the outside and for natural ventilation. The current standard defines the allowable window area in terms of sf of window per sf of conditioned space. The changed requirement would limit window area to an overall window to wall ratio (WWR) similar to the nonresidential standard. As homes become larger, this standard would not increase prescriptively allowable window area, Net energy savings would be dependent on what WWR was selected. An evaluation of current trends and current prescriptively complying homes would be required to make the argument for a given WWR along with a modeling exercise that identifies the energy impacts of different WWRs.	New
Base case Overhangs	Well-designed overhangs allow solar gains to help heat homes in winter and exclude solar gains in summer. This proposal would evaluate the feasibility and cost-effectiveness of permanent overhangs over south facing windows and how this could be incorporated into the prescriptive and performance approaches to code compliance. This requirement is a step towards requiring that homes are designed with solar orientation in mind and fewer home designs that are orientation independent will be able to comply.	New
Wall U-factor based on 6" studs	As compared to walls constructed out of 4 inch studs, walls constructed out of 6-inch studs have a greater cavity depth for insulation, and lower framing factors, which also decrease U-factor. Compare the cost of constructing homes with 6 inch studs versus 4 inch accounting for impacts on details, foundation thickness etc. Identify the lowest life cycle cost house with 6-inch studs versus one with 4-inch studs. Evaluate the feasibility and cost-effectiveness of prescriptively requiring 6-inch studs for wood frame construction. Make sense for Sempra to lead as they are already addressing other advanced wall sections AWF, SIP etc.	New
Ceiling insulation	Heels on Trusses (75% of Attic Insulation Height at Outside Edge of Exterior Wall) EEBA Builders Guides by Joe Lstiburek (www.buildingscience.com) Oregon Residential Energy Code, Advanced Framing for Walls and Ceilings, (http://oregon.gov/ENERGY/CONS/Codes/docs/res10.pdf) states that compressed ceiling insulation area on non-raised-heel truss can account for 25% of ceiling area.	New
Infiltration	Require that fireplaces are rated and sealed. Infiltration testing of envelope with fireplace in normal model (no temporary sealing of fireplace).	New
Compressor-less home based on comfort model	The California coastal regions are quite mild and with good envelope design do not need central air conditioning. This proposal develops a set of prescriptive measures and a performance approach to obviate the need for air-conditioning. Without the cost of air conditioning, duct work etc, this cost can be plowed back into making the building envelope and small space heating system very efficient. Key to this proposal is that the designed space is comfortable for most hours so that air conditioning is not retrofitted later on. Thus, a method has to be developed so that complying buildings are predictably comfortable.	New
Quality installation	Consider options to require testing of insulation installation, duct sealing, blower door testing & the incorporation of the thermal bypass checklist.	New

Codes and Standards

Greenfield developments - base case with west neighbor shading	This measure attempts to provide energy compliance incentives for designing greenfield developments to orient streets with solar orientation in mind. If streets are primarily oriented East-West, then the homes will have more solar access and be able to shade each other from the sun when it is setting to the west on hot summer days when the TDV value of energy is high. Though the cost per individual building is low, this constraint can have a significant impact on development design and how many homes can be arranged on a given parcel. This constraint is less of a problem as the parcel size increases. Understanding the repercussions of this type of requirement requires close communication with the land development industry and understanding of their financial concerns.	New
Advanced Building Envelopes	Update prescriptive residential assembly u-factors based upon the cost-effectiveness of: Advanced wood framing, structural insulated panels, insulated concrete forms. AWF, SIP, ICF	Ongoing
CALRES updates	Funding update to CARES based on roof model algorithms and applied to whole home	New
Home size energy budgets	Limit energy budgets to meet the prescriptive requirements of a 2500 sf house (for example).	New
HVAC		
Ducts	The requirements for duct sealing were motivated by the significant energy impact duct leakage. Duct sealing is required for all ducts in unconditioned spaces and the most common envelope packages also require verification by a HERS rater. This has reduced leakage at the joints in duct systems. However it is not clear whether the ducts themselves will maintain their integrity. Some anecdotes indicate that flex ducts may be frequently damaged by rodents. Also some states do not allow flex ducts. The installed cost of flex ducts is significantly cheaper and has less joints than metal ducts. This measure requires a study of duct failure rate and an analysis of whether requiring metal ducts would save energy over the long term and if so would this requirement be cost-effective.	New
Duct sealing	Should duct sealing verification by a HERS rater be a mandatory requirement? This measure must identify the average leakage rate of ducts that may be tested but have not had a HERS verification of duct sealing and compare this to the average leakage rate of HERS verified sealed ducts. Does the difference in cost justify require HERS verification in all circumstances? The HERS rating could be prescriptively required in all cases, or could be a mandatory requirement. Alternatively the credit for HERS rating could be increased (or increased energy consumption modeled for no verified sealing). The fall back is to require that duct test values are written down and certified by the installer (self-certification similar to acceptance tests).	New
Multi-zone res systems	As houses get larger, a growing trend has been to use multi-zone central air conditioners. These air conditioners can save energy as less of the home is being cooled. However, the airflow rate through the air conditioners is slowed down and pressure drop through the control dampers is high. Thus, though the loads are reduced, the effective efficiency is reduced. Identifying ways to both reduce loads and maintain a high efficiency could yield significant savings.	New
Ventilation	In response to the PIER research finding high levels of formaldehyde in residential homes http://www.iee-sf.com/pdf/SummerFieldResults.pdf The CEC have required mechanical ventilation. However for mechanical systems that recalculate the air, the maximum power is 0.58 W/cfm of supply air - with 10% outside air this could be as high as 5 W/cfm of OA. Propose a more efficient method of bringing in outside air, including reducing fan speed for recirculation systems.	New

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Ventilation	This requirement would make sure that there is sufficient outside air during the times of year when windows are closed and would provide distribution of filtered outside air to all diffusers in the home. There may be added cleaning and air quality benefit from outside air brought in through the HVAC system as compared to the current minimally compliant method of operating an exhaust fan that depressurizes the home. With an automatically controlled outside air damper, economizing can be accomplished and displace compressor cooling on cool summer nights with filtered and distributed outside air.	New
DR controls	Develop a code requirement and acceptance tests for Programmable Communicating Thermostats (PCTs) that reset temperatures upon receiving a demand response signal from the local utility. Such a test would assure the PCT is receiving a demand response signal and that it is responding appropriately when receiving a test signal.	New
Standby losses	Reduce standing losses in residential HVAC units. These requirements would include requiring an electronic ignition for furnaces and require a control that minimizes the use of the crank case heater. Such a control would limit the crankcase heater to times when the crankcase is cold and when the compressor is about to operate.	New
Ventilation Cooling	Improve CALRES to better assess and give credit for ventilation cooling	New
Pre Cooling	Evaluate pre cooling strategies	New
Lighting		
High efficacy lighting	Currently the high efficacy lighting requirement in dwelling units allows one to be exempt for this requirement if occupancy sensors or dimming controls are used. With advances in LED and ceramic metal halide lighting there are few lighting applications that cannot be accomplished a high efficacy source. This proposal would consider a maximum wattage in a home that is not high efficacy regardless of the type of controls installed. A high efficacy luminaire contains a hardwired ballast or driver or has a GU 24 socket.	New
High efficacy lighting	Update Table 146-C "HIGH EFFICACY LUMINAIRE REQUIREMENTS" so that best economically available lighting technology satisfies the luminous efficacy thresholds. This has to be carefully evaluated to allow a range of technologies while eliminating the lowest performers in each class of high efficacy light sources.	New
Controls	Propose a maximum wattage per light switch. In some cases having all lights on one switch in a room results in more lights being turned on than would be if more light switches were available. Identify a cost-effective wattage limit.	New
Water Heating		
Solar pool heating	Solar pool heating can displace gas or electric heating cost-effectively. Unglazed solar water heating panels are inexpensive and can make use of the pool filtration pumping system to move the water through the panels. However many pools are not heated and others are heated for a small time of the year. Thus, it is likely that there are climatic and applications and pool sizes that solar pool heating is very cost-effective and feasible. Identify under which conditions solar pool heating is cost-effective and applicable.	New
Solar water heating	Electric water heater costs approximately 3 times more than gas water heating. Thus, the cost-effectiveness of solar water heating is more attractive when it is displacing electrically heated water as compared to gas-heated water. Develop a solar water-heating requirement for electrically heated water.	New
Water heaters	Almost half of the losses in natural draft storage tank water heaters are due to standing losses. Much of this loss is due to air flowing through the combustion and heat exchanger passages in the water heater when it is not firing. Flue dampers can be interlocked with the gas valve, so that the damper closes and inhibits airflow through the heat transfer surfaces when the burner has cycled off. Evaluate whether this measure is preempted by Federal water heater regulations or if this can be considered as an efficiency add-on that is not pre-empted. Compare the life cycle energy savings of this measure to the added first costs of adding the flue damper. Consider the cost of systems where the flue damper is incorporated into the water heater.	New

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Pipe diameter based on new flow rates	With smaller diameter pipes, less water is expelled before hot water is received at plumbing fixtures. When water is warm that is sitting in the pipe, this results in energy savings and in all cases this reduces wastage of water. Even for cold water this saves water as sometimes people clear the lines waiting for cold water to emerge from the faucet for drinking. Since 1990 EPACT, a number of plumbing fixtures have reduced water consumption. Updating the Uniform Plumbing Code is long overdue and can save energy and water. This would require working with the appropriate IAPMO committee and providing technical support that reducing pipe diameters would not cause excessive pressure drop while providing important benefits.	New
Showerheads	Determine cost effective energy savings code improvement opportunities for preventing showers in residences with multiple heads.	Ongoing
HW distribution	Improve res water heating distribution system design	Ongoing
Appliance Loads		
Gas connection for dryer	26% statewide and 42% in PG&E's territory have electric dryers in homes with gas space heating. The UEC for gas dryers is 746 kWh/yr whereas the gas consumption for gas dryers is 31 therms per year. The source energy for electric drying is approximately 1-1/2 times as great and also cost to the consumer is higher than gas. Requiring a gas stub to the laundry room or laundry area in the garage removes a significant barrier to purchasing a gas dryer throughout the life of the home.	New
Pressure drop in dryer exhaust	The manufacturers of dryers recommend the use of hard (rigid) piping to exhaust moist air from dryers. Hard pipe does not kink or get crushed, is less likely to become clogged with lint and will likely have less pressure drop than the flexible accordion type piping. With less obstruction and less pressure drop, higher airflows are likely. With higher airflows, laundry will dry faster and this requires less heating of air.	New
Expand coverage to plug loads	Will be necessary to bring down plug loads approx. 30% to attain zero net energy homes.	New
Water Efficiency		
Landscaping	Requiring that new homes have irrigation systems with moisture sensors reduces water waste associated with watering when the ground is still wet such as after a rainstorm. Evaluate the effectiveness of the technology and the actual savings from this technology. Compare the equipment costs to the water cost savings. Such an analysis will recognize that the cost of water varies by regions of the state (water is more expensive in Southern California.)	New
Water recirculation	Sinks or showers that are located far from the water heater can benefit from recirculation loops that provide hot water to the fixture without having to throw away the warm water in pipes to the drain. This measure saves both energy and water. Evaluate how well this technology works and how reliably it saves water and energy. Evaluate the cost-effectiveness of this measure.	New
Water monitoring	Requirement that all new homes must be metered.	New
Water capture & storage	Evaluate the feasibility and cost-effectiveness of a cistern system that collects rainwater that drains off the roof of a home. This cistern stores the water for use in landscape irrigation or for flushing of toilets.	New
Cooling tower water re-use	Evaluate the evaporative cooling water re-use of irrigation of flushing toilets and the impact this has on water treatment. Is such re-use cost-effective and feasible?	New
Alternative energy infrastructure		
Solar ready	Consider the costs and benefits of south facing roofs. The purpose of a south facing roof requirement would be to support the addition of solar water heating or PV systems now and in the future. Compare the costs of mounting solar systems on east or west facing roofs (counter-racked) discounted over time and with extra strength accounting for wind loads as compared to the financial benefit of the added flexibility to face the roof in any direction.	New

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Plug-in hybrids	Plug-in hybrids may be a big part of our energy future. Plug in hybrids could be providing significant improvements to air quality, the efficiency of car transportation and may provide a large battery to draw power during times of system peak. Evaluate the costs and the lost opportunity presented by pre-installing conduit to all garage parking spaces. This analysis would consider the likely probability of plug in hybrid market share. This evaluation needs to account for the societal cost of local gasoline combustion versus remote electricity generation, and the trade-off between the value of local emissions and depleting battery storage during peak periods.	New
Reach Standards		
Green building codes	Developing improved above code energy requirements that may be used as a model ordinance	New
Advanced performance rating methods	Appendix G –type method of modeling advanced standards (link with rules processor work)	New
Compliance process		
Compliance process	Propose single measure forms for retrofits that might receive a counter permit. Such forms would be shorter and focus on prescriptive compliance to alteration measures.	New
Streamlined code	Consider a proposal to split Title 24 into three shorter codes for residential, nonresidential and multi-family occupancies. Identify opportunities to streamline the code and simplify compliance.	New
Commissioning	Propose acceptance tests from experience with retro commissioning or commissioning programs that have identified common failure modes that can be identified with a short directed acceptance test.	New
Operations	Research and propose a method to assure that new building owners receive a permanent copy of the information needed to maintain and operate building equipment efficiently. Also that the building owner receives copies of the acceptance tests and are made aware that these acceptance tests are the promise by the testing agent that the equipment works correctly on the day of the test.	New
Acceptance Tests	Evaluate existing acceptance tests and make recommendations for improvement - CA Commissioning Collaborative	Ongoing
Climate zones	Remapping San Diego climate zones, the location of the boundary between climate zones is not correctly located in terms of the climate distinction between the mild zones and extreme hot or cold zones. This proposal looks at evaluating moving the existing climate zone boundaries to provide a better representation of the climate distinctions for example between the milder climate zone 7 and hotter inland climate zone 10.	Ongoing

Title 20 Appliance Standards. Ongoing advocacy efforts will extend into the 2009 – 2011 program cycle.

Measure	Description	Status
Lighting		
Linear fluorescent fixtures	This standard proposal is currently on hold pending a decision on which test method and efficiency metric are most appropriate. Both Ballast Efficiency Factor (BEF) and Luminaire Efficacy Rating (LER) have been proposed.	Ongoing
Decorative string lights	This standard proposal refers to string lights commonly used for Christmas decoration. Set a two-tier standard for the maximum power use per lamp, starting at 0.25 W and reducing to 0.1 W.	Ongoing
Night lights	Set a standard for maximum annual energy usage and maximum standby power.	Ongoing
Ill. street number	Set an efficacy standard that will require LEDs and photocontrols.	Ongoing

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signs		
Plug-in luminous signs	Set a standard establishing maximum power per square foot of illuminated area, and additional control requirements.	Ongoing
Signage power supplies	Set minimum standards for efficiency depending on signage type (neon, LED, etc).	Ongoing
HVAC		
N/A	N/A	
Game consoles	Set standard to require an auto power down feature and establish a maximum allowable standby power level.	Ongoing
Computer/video displays	Set maximum On Mode and Sleep Mode power consumption levels, as a function of screen size.	Ongoing
Set top boxes (terrestrial, cable and satellite)	TBD--may include prescriptive requirements such as auto-off feature and performance-based maximum power demand per defined feature set (for example, per tuner)	Ongoing
TVs	Set minimum efficiency standards as a function of screen area. Standard will have two tiers, with the first tier equal to ENERGY STAR +25%.	Ongoing
Appliances		
Compressed air drying	Refrigerated compressed air driers based on widely available non-cycling technology with substantial energy savings. Set minimum efficiency standards for compressed air dryers rated greater than x cfm.	New
Wine chillers	Set minimum efficiency standard for all refrigeration units classified as wine chillers.	New
Microwaves	Some microwaves with dual baking/toasting functions may not currently be covered by any efficiency standard. Investigate and set minimum efficiency standard for such microwaves.	Ongoing
Misc		
Battery Chargers	Set minimum efficiency standard for three modes: Active, Standby, and Maintenance. Propose a two tier, staged standards approach, addressing first a near term standard to identify and regulate the least efficient products, and second, an eventual standard for improved efficiency.	Ongoing
Fractional HP motors	Set minimum efficiency standard for motors in the 1/4-1.5 HP range. The DOE is also currently working on a standard for fractional HP motors, but the scope may exclude a large number of 1-1.5 HP motors.	Ongoing
Solar thermal pool heaters	Develop a test method for determining the hydronic efficiency of solar thermal pool heaters. Move on to set a minimum standard for hydronic efficiency.	New
Portable spa covers	Set a minimum standard for insulation R value.	New
Landscape Irrigation	Set performance standards and labeling requirements for landscape irrigation controls and sensors on or before January 1, 2010 effective on or after January 1, 2012.	New
Commercial Radiant Heaters	Set a minimum standard for commercial radiant heater. Currently, commercial radiant heaters are not governed by federal or California appliance efficiency standards.	Ongoing
Commercial Clothes Dryer	Energy performance of residential clothes gas dryers is regulated by federal laws, which preempt California Title 20 standards. Commercial gas dryers are regulated by neither federal nor California regulations. There exists the opportunity to establish new Title 20 standards to improve overall energy efficiency for commercial gas dryers to be sold in California.	Ongoing

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Vented Gas Fireplaces	The average efficiency of these units is approximately 55%, setting the California Title 20 Standard according to Canadian Standards Association CSA-4.1. which recommends testing certification labeling, and adding a California minimum efficiency of 55%.	Initiated
Gas Convection Ovens	Set a minimum standard for commercial gas convection oven. Currently, commercial gas convection ovens are not governed by federal or California appliance efficiency standards.	Ongoing
Ice Makers	Evaluate and compare the performance of a typical cube-type machine with a nugget type. In particular, the performance evaluations will focus on electric demand, energy use, efficiency, and energy use per unit mass of ice.	Ongoing
Walk-In Coolers, California, Title 20	Develop prescriptive requirements for walk-in coolers under 3,000 square feet. Per EISA 2007 (assuming the typo is corrected), California has an opportunity to develop and implement a Title 20 regulation prior to the federal preemption.	Ongoing

DOE Proceedings. The IOUs expect to be actively engaged in Federal standards proceedings that affect California. Federal advocacy during the current program cycle includes the following topics.

- External Power Supplies & Battery Chargers – DOE Framework Document and Determination Notice / Advanced Notice of Public Rulemaking;
- Refrigerated Beverage Vending Machines – DOE Notice of Proposed Rulemaking
- Incandescent Reflector Lamp and General Service Fluorescent Lamp - DOE Notice of Proposed Rulemaking, and Negotiation;
- Residential Water Heaters, Direct Heaters, Pool Heaters - DOE Advanced Notice of Proposed Rulemaking and Notice of Proposed Rulemaking;
- Small Motors Test Method - DOE Notice of Proposed Rulemaking;
- Residential Clothes Washers – DOE Framework Document;
- Walk-in Coolers & Freezers – DOE Framework Document;
- Metal Halide Lamp Fixtures – DOE Framework Document;
- External Power Supplies & Battery Chargers – DOE Determination of Final Rule / Advanced Notice of Public Rulemaking;
- Residential Refrigeration – DOE Advanced Notice of Public Rulemaking
- Small Electric Motors – DOE Notice of Proposed Rulemaking;
- Clothes Dryers & Room Air Conditioners – DOE Advanced Notice of Proposed Rulemaking;
- Residential Central Air Conditioner and Heat Pump – DOE Advanced Notice of Proposed Rulemaking and Negotiation; and
- Fluorescent Ballasts – DOE Advanced Notice of Proposed Rulemaking

The IOUs' Extension of Advocacy includes, but is not limited to:

Title 24	Title 20
Residential Hardwired Lighting	General Service Incandescent Lamps
Residential Duct Improvement	ER and BR Lamps
Lighting Controls Under Skylights	Residential Pool Pumps, High Efficiency

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	Motors
Duct sealing , New and Existing Commercial Buildings	Portable Spas
Outdoor lighting including sign lighting controls and wattage allowances	Pulse Start Metal Halide HID Luminaires
Tailored Lighting for High LPD Retail	Portable Lighting
DR Lighting Controls and HVAC (DDC to Zone)	Consumer Electronics - Audio Players
Demand Controlled Ventilation (DCV)	Consumer Electronics – TVs
Pool piping, motors and controls	Consumer Electronics – DVDs
Cool roofs	Unit Heaters and Duct Furnaces
HVAC equipment testing (res) and acceptance tests (Non-Res)	External Power Supplies

8. Coordination & Integration

a) Describe statewide IOU coordination efforts that will guide program implementation

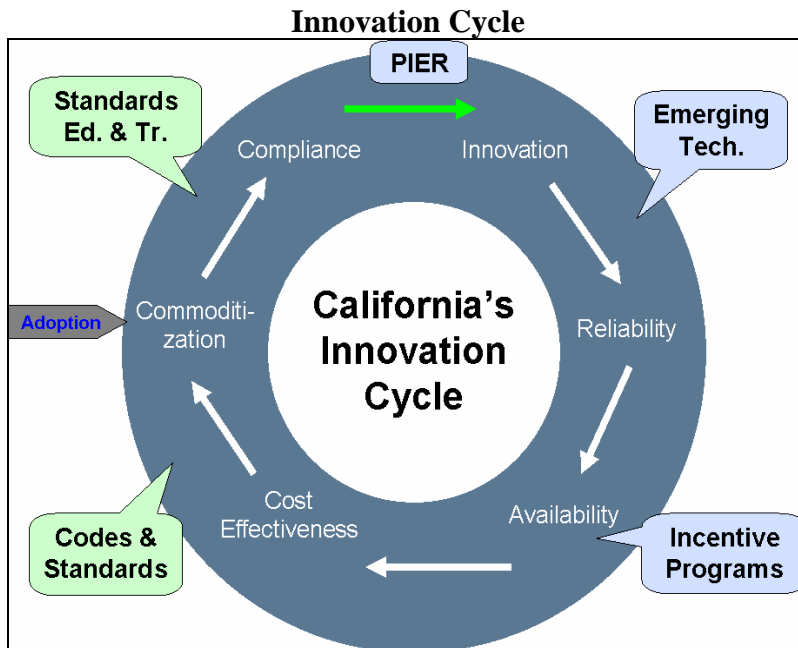
See discussion in above sections.

b) C&S Statewide Coordination

Requirements for C&S coordination are derived from the CPUC's objective to mitigate climate change through regulatory objectives, including Title 20 and Title 24. While the Statewide C&S program comprises the primary intervention to achieve these objectives, it must be considered within the context of California's innovation cycle:

- Adoption causes commoditization in the sense that a once high margin product becomes the industry standard;
- Commoditization spurs companies to innovate;
- Innovation creates new, differentiated, high-margin products for the competitive market;
- Voluntary programs commercialize new innovations; and
- Commercialization creates code-readiness leading to adoption.

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Since the primary purpose of the Statewide C&S program is to propose and support adoption of code enhancements, it is essential that IOUs collectively respond to all significant energy savings opportunities identified for a future code update cycle. For example, IOUs are now planning how best to coordinate efforts to address a long list of potential T-24 code enhancements for the 2011 code cycle. In general, planning is conducted on an as needed basis.

Codes and standards operations are conducted relative to a multi-year time horizon, so statewide meetings organized on a quarterly basis are sufficiently frequent to coordinate activities. Some CASE studies are developed through co-funding agreements when multiple IOUs are interested in or have specific value-added knowledge, perhaps through previous research. More typically, however, one IOU on behalf of the statewide IOUs develops code proposals, since each proposal is a fraction of the program budget. During these meetings, our primary objectives are to discuss CASE study objectives and develop mutual support for public proceedings.

The program will enhance coordination and integration of Codes and Standards with other IOU energy-efficiency programs to maximize energy savings and demand reducing by coordinating training programs and utilizing the experience gained in resource programs to inform the development and advocacy of new codes. C&S will work with the Government Partnerships to improve code compliance, adopt above code ordinances, and provide training/education. C&S will focus compliance improvement efforts on HVAC new installations and replacements in coordination with the HVAC program. C&S will also meet periodically with HVAC program staff to discuss compliance improvement strategies, training, and other program needs.

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Coordination between the C&S and other parts of the IOU portfolio falls into one of two categories: existing standards and future standards. Compliance with code is essential to completing the commoditization process and capturing the benefit of commercialization efforts for the benefit of society, so the CE sub-program leads efforts to implement existing standards through development of core activities that can be delivered either through, or in coordination with, other programs. Opportunities are identified through small group meetings between C&S and each target group such as workforce education and training, local government partnerships, new construction programs, etc.

Small group meetings also serve to identify incentive program opportunities to leverage the pull of existing standards that have effective dates far enough in the future to accommodate program changes. For example, an appliance standard adopted with an effective date two years hence would provide an opportunity to develop an incentive program pull that complements the C&S push.

Coordination activities around future standards are, likewise, developed through individual targeted meetings. Once the C&S team has identified potential code enhancement opportunities for a future code proceeding, the team meets with Mass Market, Targeted Market, Emerging Technologies, HVAC, demand response, or general education and training leads to discuss gaps between adoption needs and current code readiness. As appropriate, new measures may be added to incentive programs, new projects may be added to the ET portfolio, etc. Sometimes, when ongoing CEC proceedings coincide with incentive program planning, incentive offerings can be integrated with code enhancement proposals to increase influence on proceedings.

Coordination with external organizations falls into a few broad categories. A particular code proposal typically attracts directly affected industry stakeholders. If an industry employs associations organized to oppose energy-efficiency standards – which is usually the case – IOUs will seek support from other advocates and share information that enables their advocacy, as well as ours. Sometimes IOUs are able to work directly with industries that are not, in principal, opposed to all regulations.

c) C&S Coordination with EE Resource & Non-Resource Programs

As Federal preemption continues to grow, and as DOE continues to increase federal proceedings activities, it is necessary for California IOUs to increasingly engage with national organizations such as American Council for an Energy Efficient Economy (ACEEE), Appliance Standards Awareness Project (ASAP), and the Natural Resources Defense Council (NRDC). In particular, since the innovation engine, as pictured above, turns over once every three years in California and once every eight to ten years at DOE, the C&S program needs to work with national organizations to relax federal preemption policies to better help California meet AB 32 energy-efficiency targets. California IOUs have ramped up operations to contribute materially DOE proceedings through analysis, letters, negotiations, etc.

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At a statewide and local level, the C&S program will develop training and compliance improvement activities with entities that include, but are not limited to, California Building Industry Association, local chapters of the Building Industry Association, Build it Green, Institute of Heating and Air Conditioning Industries, International Brotherhood of Electrical Workers, National Electrical Contractors Association, California League of Cities, etc. Additionally, outreach and communications for Title 20 will include industry associations such National Electric Manufacturers Association, American Lighting Association, California Retailers Association, and the International Pool and Spa Association.

How the Codes & Standards Program will coordinate with Other Energy Efficiency Programs

Program With Which C&S Will Coordinate	Coordination with Advocacy Sub-programs	Coordination with CE or RC Sub-programs
HVAC	<ul style="list-style-type: none"> ➤ Research possible scenarios to help improve HVAC quality construction ➤ Develop a whole building comfort metric that is the basis of compressor-less homes in the coastal climate zones ➤ Review mandates to increase the use of FDD and improvements to FDD technologies 	<ul style="list-style-type: none"> ➤ Research the HVAC permitting tools available on the market, select permitting tools to test during the local government process pilot, and determine which best practices and tools to incorporate into the building official and HVAC contractor role-based training curriculum the program will develop. ➤ CE will work with the CEC, CALBO and the CSLB to identify possible penalties that may be applied to contractors who do not pull required permits or operate without the appropriate licenses. The program will investigate potential penalties during the local government process pilots and incorporate those penalties that prove effective during the pilot into the role-based training curriculum that the program will develop and roll out to additional jurisdictions. ➤ CE sub-program personnel will work with HVAC Quality Installation and Workforce Education and Training program staff, utility education centers, and regulatory agencies to develop a brand, incentive mechanism, and consumer campaign, and technician training and certification programs. CE will evaluate the recently completed ACCA (Air Conditioning Contractors of America) Quality Installation Specification that has been adopted by the EPA Energy Star Program to determine how to incorporate this into role- and measure-based training to be provided

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Program With Which C&S Will Coordinate	Coordination with Advocacy Sub-programs	Coordination with CE or RC Sub-programs
		<p>by the IOUs.</p> <ul style="list-style-type: none"> ➤ Investigate the feasibility of an HVAC serial number tracking process to increase compliance. Various HVAC industry groups and HVAC distributors have expressed an interest in pursuing this as a way to increase the quality of installations and better ensure Title 24 compliance.
Government Partnerships		<ul style="list-style-type: none"> ➤ CE sub-program personnel will conduct a holistic process pilot in select building departments in addition to developing and delivering role-based tools and training to building department personnel. ➤ RC sub-program personnel will encourage local governments to lead by example, and to adopt codes for government buildings that match or exceed the requirements for the private sector within their jurisdiction. Those local governments that do not wish to adopt reach codes for the private sector will be encouraged to at least adopt more stringent codes for their own buildings. ➤ Initial C&S efforts will focus on encouraging and supporting local governments, designers, and builders/contractors to implement and enforce existing acceptance testing requirements. CE will work with the CEC, CA Commissioning Collaborative, and industry organizations such as SMACNA to conduct outreach and provide acceptance-testing education at all levels of the supply chain.
Workforce Education and Training		<ul style="list-style-type: none"> ➤ CE will work with Workforce Education and Training program managers, CABEC, Sonoma State University, CalPoly San Luis Obispo and others throughout the state to develop a curriculum that can be implemented at the state and community college level to expand current energy-related offerings and train building energy analysts in the theory and concepts of energy-efficient building design, simulation and construction. ➤ CE is working with IBEW, NECA, California Community Colleges, and

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Program With Which C&S Will Coordinate	Coordination with Advocacy Sub-programs	Coordination with CE or RC Sub-programs
		<p>others to develop and implement an electrical contractor's training program for advanced lighting controls. This is a critical step in facilitating the installation of the sophisticated lighting controls that are essential to meeting the AB1109 Huffman Bill and zero net energy goals.</p>
<p>Targeted Markets/Mass Market/Emerging Technologies</p>	<ul style="list-style-type: none"> ➤ Through small group meetings, C&S will work with the Mass Market, Targeted Market and Emerging Technologies programs to identify incentive program opportunities to leverage the pull of existing standards that have effective dates far enough in the future to accommodate program changes. For example, an appliance standard adopted with an effective date two years hence would provide an opportunity to develop an incentive program pull that complements the C&S push. For promising measures that are evaluated by the ETP, the C&S program may propose that they are included in reach codes in parallel with EE incentive programs. ➤ C&S will work with the targeted and mass-market program managers to require program participants to complete and submit the applicable acceptance tests required by Title 24 to receive an incentive for HVAC and lighting controls equipment. This will increase compliance with the acceptance tests and help assure the incented equipment is installed according to code intent. 	<ul style="list-style-type: none"> ➤ CE will work with fellow energy-efficiency program managers to identify and fulfill code-related training needs in order to keep program managers up to date on current and future codes, and to help prepare IOU sales reps with the knowledge they need to effectively market incentive programs.

d) C&S Coordination with Crosscutting Programs (ETP, Statewide ME&O, WE&T etc.)

See Table in Section 8.c above

e) C&S Coordination with IDSM

The Codes & Standards Program will coordinate with SCE Demand Response, Energy Efficiency, and other IOU and regulatory stakeholders as well as local governments to work towards the development and application of new codes and standards that integrate DSM for gains in demand and consumption as well as market

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transformation. It will be important to apply the IDSM view to codes and standards to ensure that future C&S are enabling to and restrictive of integrating DSM options into buildings and equipment. The Codes & Standards area offers the opportunities to make significant progress on market transformation because actions can be taken that are lasting, and not dependent on sustained patterns of operational behavior. The Codes & Standards Program will work with the CEC as well as industry organizations such as those representing building operators and equipment makers and engineers. The program will be closely coordinated the Emerging Technologies Program as well as discussed in the ET PIP.

f) C&S Coordination with External Organizations & Entities

See Table in Section 8.c above

9. Marketing & Outreach/Education & Training

Outreach for advocacy activities occurs through telephone calls and e-mails to industry stakeholders throughout the CASE study development process, leading up to commencement of a CEC rulemaking. After commencement of CEC rulemaking proceedings, CASE studies are presented during public workshops and hearings conducted by the CEC that are typically attended by building or appliance industry representatives, environmental groups, compliance industry representatives including local government officials, advocates from other states, etc. In response to industry issues and concerns, the IOUs and their consultants will contact specific representatives or conduct stakeholder meetings to address specific issues more broadly. Following adoption hearings, the IOUs participate in developing compliance manuals.

Compliance improvement encompasses numerous industries engaged in supplying buildings and appliances to California; hence, outreach and marketing activities will be conducted through a variety of channels. IOU's training centers will conduct direct outreach to industry associations such as the Contractor State Licensing Board, California Building Officials Association, California Association of Building Energy Consultants, Consumer Electronics Association, and National Electrical Manufacturers Association. E-mail solicitations and paper calendars are sent to individuals notifying them of upcoming classes. Local governments will also be contacted through local government partnerships and circuit riders assigned to provide consulting services.

10. Quality Assurance & Evaluation Activities

To help ensure quality assurance and effective evaluation, the IOUs will continue their ongoing efforts to track and assess the effectiveness of the Codes and Standards Program in advocating for new codes, and for increasing compliance with existing codes.

The program will continue to support the impact evaluation efforts of the CPUC and its contractors by documenting code advocacy efforts, and documenting compliance improvement efforts and education and training efforts and their effects on participant behavior. The IOUs will coordinate with the CPUC and their impact evaluation contractors to ensure that the sufficient type and level of data are being collected at the appropriate level of detail to enable an estimation of energy savings related to codes and

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standards activities. This includes supporting the CPUC in their research effort to establish Title 20 and Title 24 baselines, and track changes in adoption and compliance over time. This includes providing appropriate program data, as well as encouraging the participation of vendors, contractors, building officials and others, as appropriate in providing information for establishing baselines and changes in penetration over time.

For the purpose of quality assurance in carrying out and improving the Codes and Standards Program, the IOUs will be conducting various qualitative evaluation activities to establish IOU effectiveness in various market transformation activities. These include but are not limited to:

- Code adoption - Research with participants in the code adoption process to assess the level and quality of participation by the IOUs and other stakeholders. This includes interview-based research, as well as review of documentation of participation.
- Compliance Enhancement – Effectiveness of various education and training activities, based on pre- and post- participation assessment of ‘knowledge swing’ of participants, and commitments to action made by participants and participant organization that stem from CE activity. Initial assessments will be succeeded by assessments in the post period to identify changes in code-related activity resulting from CE.
- Reach Code Assistance – Effectiveness of IOU efforts to assist local governments in establishing, implementing and enhancing compliance with reach codes. Initial assessments of energy codes and code compliance, local code support capability and other factors will be followed by an ongoing assessment of the effects of IOU reach code assistance.

For CE, the IOUs will be using this assessment process to identify changes in awareness, capability and behavior change among individual CE participants, and participant organizations, resulting for the various CE activities. The IOUs will also look into calibrating our assessment of CE through evaluations of non-participant awareness, capability and behavior changes. For example, if there is a CE effort focused on building officials, the research could include an assessment of awareness, capability and behavior of building officials who did not participate in the training.

Additional, formative research will be conducted to provide insight into emerging issues related to current and pending codes and standards. Specifically, research will be carried out to identify issues and trends appearing along the delivery chain for appliances, as well as for building practices.

11. Program Theory & Logic Model AND Performance Indicators

Following are draft logic models and program theories for:

- a) Building Codes and Appliance Standards, including Extension of Advocacy
 - Including a separate logic model for Federal Standards Advocacy.
- b) Compliance Enhancement
- c) Reach Codes

Logic models will be improved based on experience and finalized based on application to specific industries, local governments, etc.

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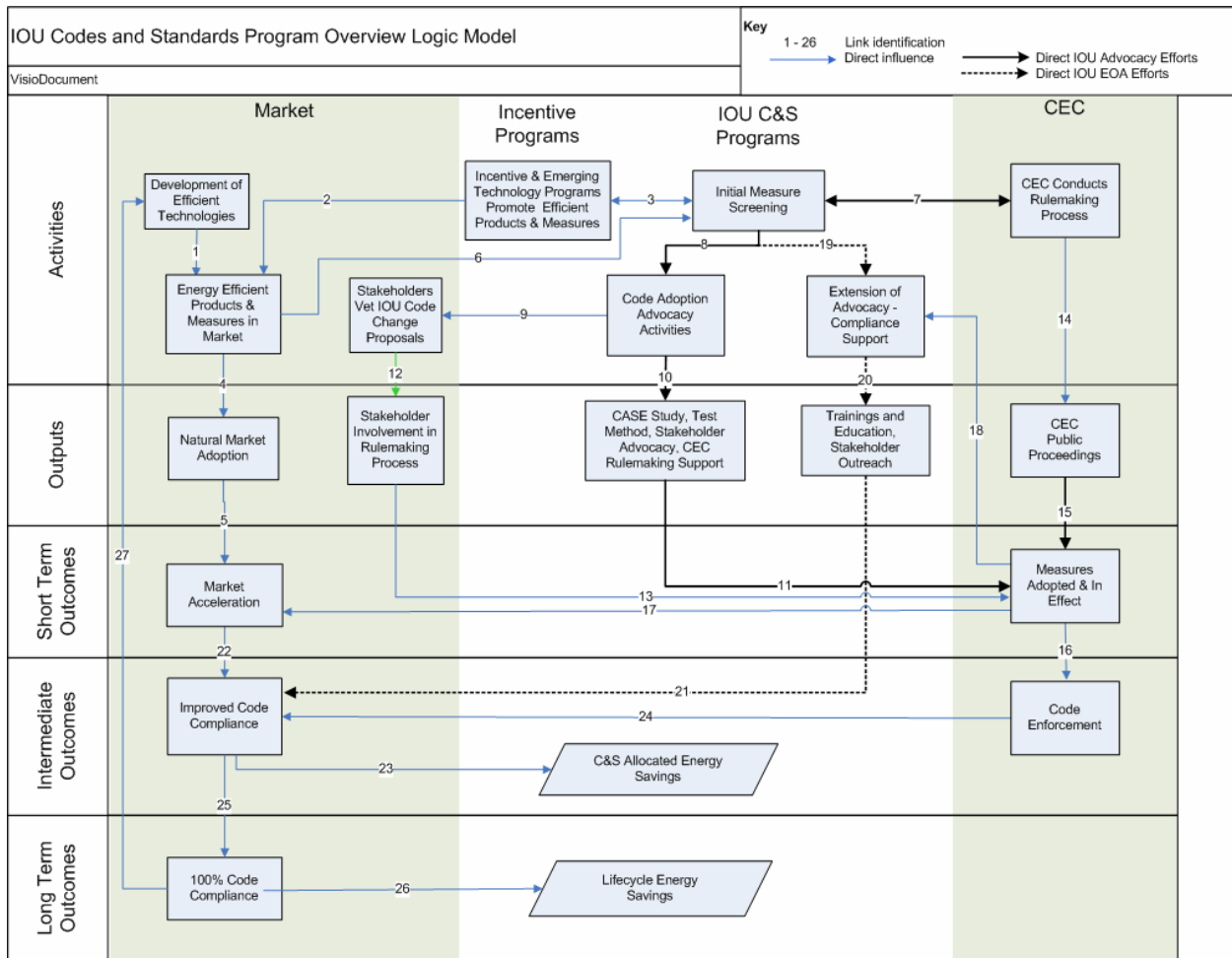
Logic Models and accompanying Program Theory and Program Indicators are tools designed to illustrate program structure and operation for the purpose of program management. This logic model is a schematic of the program as planned.

A program theory is the basis of a logic model. Effective program management applies program theory, and related performance indicators are used to determine whether program theory is correct. Indicators enable informed management responses that improve programs.

Performance indicators are intended to serve as a program's 'dashboard'; displaying information necessary for effective program operation. As with automobile dashboards; indications are neither good nor bad, but enable appropriate management responses that maintain and/or improve program performance.

Logic models, program theories, and performance indicators can provide evaluators an understanding of program activities, outputs and outcomes. However, they are not intended as the basis for estimating, valuing, or attributing program savings as they focus on program operation rather than program results.

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C&S Program Overview Program Theory and Indicators

Link	Program Theory	Potential Indicators
1	As companies develop and promote new efficient technologies, the sales of high efficiency technology increases	<ul style="list-style-type: none"> • Market share of the new, efficient technologies
2	Incentive programs and emerging technology programs lead to market awareness and adoption of efficient products and practices, increasing their market share	<ul style="list-style-type: none"> • Identification of incented measures with C&S adoption potential • Increase in market shares of measures due to incentive program activities
3	C&S program leverages the experiences and expertise of incentive programs to identify areas for code improvement opportunities	<ul style="list-style-type: none"> • C&S program seeks market and technical information from incentive programs • Communication between C&S programs and incentive programs • Code change ideas suggested by incentive programs
4	Incentive programs increase efficient products and measures in the market, leading to sustained (pre-code) natural market adoption	<ul style="list-style-type: none"> • Product availability in the market • Incentives provided by IOU incentive programs • Increase in market shares over time and place • Reduction in incremental costs
5	Market adoption, sped by IOU incentive programs, leads to market acceleration	<ul style="list-style-type: none"> • Increased market penetration of efficient products and practices
6	IOUs conduct initial assessment of code change opportunities using market data (including market penetration, time in market, number of vendors)	<ul style="list-style-type: none"> • Initial IOU assessment of measures/products, including market data indicates level of measure code-readiness
7	IOUs share the code change screening results with the CEC and coordinate code change proposals with the CEC	<ul style="list-style-type: none"> • IOU communications with CEC staff • IOUs assessments and recommendations presentations to CEC; • CEC selected measures for possible C&S adoption
8	IOUs use the results of the initial assessment to determine which measures should be the focus of C&S advocacy efforts	<ul style="list-style-type: none"> • Final IOU screening documents
9	IOUs inform stakeholders of code	<ul style="list-style-type: none"> • Initial communication with stakeholders

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Link	Program Theory	Potential Indicators
	change proposals, seek industry data and input for code adoption and revision	regarding CASE studies <ul style="list-style-type: none"> • CASE Study support documents (market research, product testing data, communications with stakeholders)
10	IOUs C&S program conduct full range of advocacy efforts to ensure successful code change, including technical and market studies, test method development, outreach and advocacy to stakeholders, support to CEC's rulemaking processes	<ul style="list-style-type: none"> • CASE Study support documents (market research, product testing data, communications with stakeholders) • IOU workshops • IOU supported test method development and collected test data • Communication with stakeholders • Communication with CEC staff
11	IOUs C&S advocacy lead to CEC adoption of new standards	<ul style="list-style-type: none"> • CASE study report filed with CEC • Percentage of CEC workshops in which IOUs present or respond to comments • IOU presentations at CEC Workshops. • IOU's provide technical responses to stakeholder issues raised in CEC process, including responding to comments and concerns voiced by stakeholders • IOU response to stakeholder concerns and issues • Code change language developed by IOUs • Responses to stakeholder comments to clarify issues and to defend energy-efficiency positions • Support gained from stakeholders and CEC staff
12	After IOUs' outreach efforts, stakeholder participating the IOU CASE study and CEC rulemaking processes	<ul style="list-style-type: none"> • Stakeholders' participation in IOU workshops • Responses to IOU data request • Stakeholder comments regarding code change proposals
13	Industry advocates may file comments with the CEC and participate in CEC workshops and meetings	<ul style="list-style-type: none"> • Stakeholders' comments filed with the CEC and presented during workshops (including those not in favor of energy-efficiency positions) • Presentations at CEC Workshops

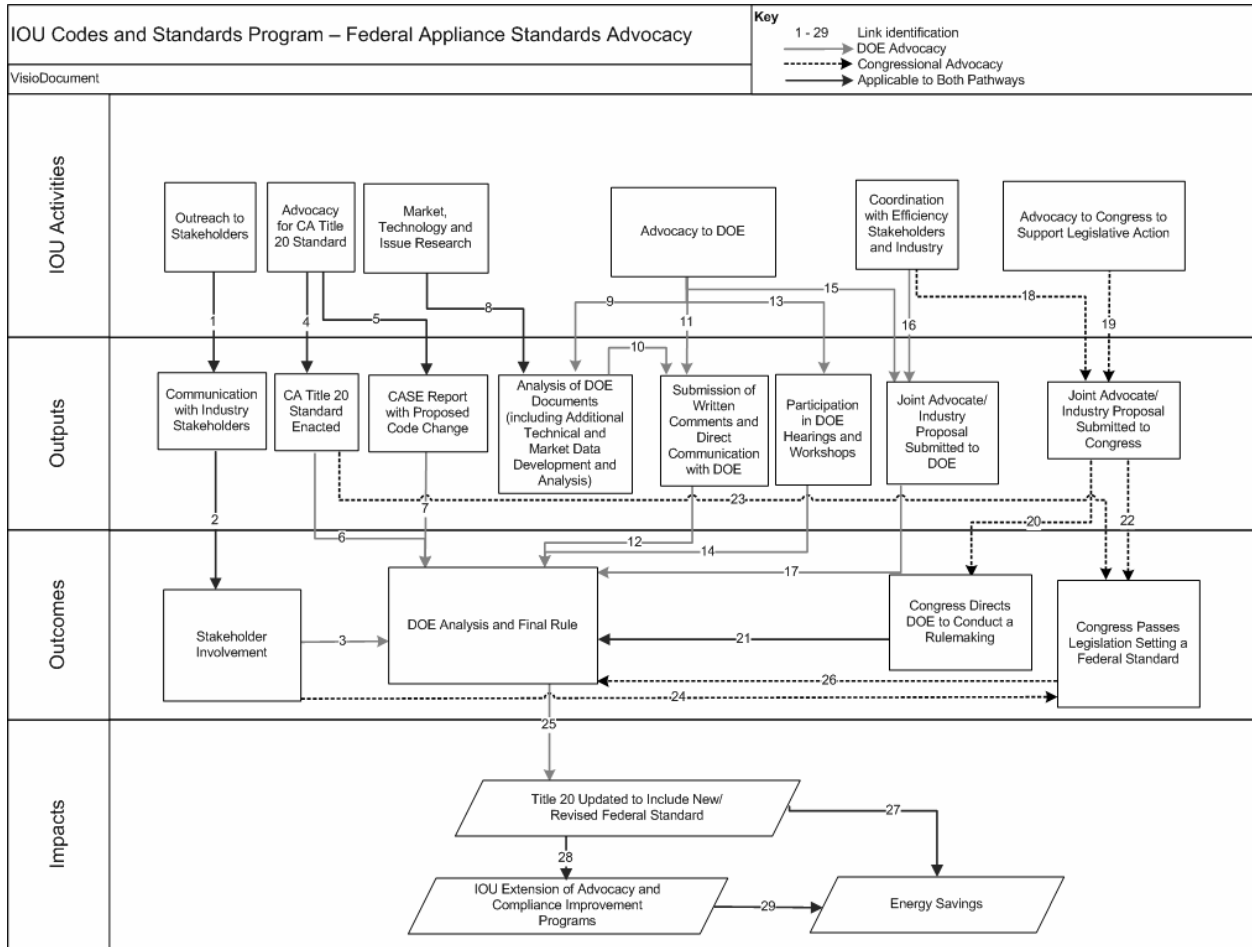
Codes and Standards

Link	Program Theory	Potential Indicators
14	Initial CEC vetting of measures produces list of measures for CEC consideration during the Public Code Adoption Proceedings	<ul style="list-style-type: none"> • CEC analysis and workshop discussions of initial measures, public notices and scheduling of workshops • Percentage of total potential savings that will be adopted as a result of IOU advocacy
15	CEC code adoption process leads to new standards being adopted and taking effect	<ul style="list-style-type: none"> • Final published CASE Study • Updated Title 20/24 Standards adopted and published by CEC
16	After a standard is adopted, the CEC works to enforce the new standard	<ul style="list-style-type: none"> • Public notice of new/revised standards
17	The adoptions of stringent energy efficient standards accelerates market adoption of efficient technologies	<ul style="list-style-type: none"> • Increased market penetration • Studies of initial compliance (by CPUC evaluators or IOUs) • Initial compliance rates
18	As new standards are adopted and take effect, IOUs carry out Extension of Advocacy (EOA) efforts to increase compliance to new codes	<ul style="list-style-type: none"> • IOU EOA planning efforts
19	IOUs select measures to focus EOA efforts, based on initial screening of potential measures. Timely CPUC C&S compliance rate evaluation study would help IOU to identify areas for improvement	<ul style="list-style-type: none"> • CPUC initial C&S compliance rate evaluation study results • Development of compliance improvement goals and detailed statewide implementation plan in 2009, including program targets • Revised EOA implementation plans following assessment of progress relative to implementation plan goals in 2010 and 2011
20	IOUs conduct EOA activities to improve C&S measure compliance	<ul style="list-style-type: none"> • C&S training and education • Stakeholder outreach activities • IOU provided compliance tools and resources • Number of market actors trained
21	IOU EOA efforts will help industry (market actors) comply with standards thereby pushing the market towards increased efficiency	<ul style="list-style-type: none"> • Increased awareness and understanding of new standards by stakeholders • Improved building department permitting processes

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Link	Program Theory	Potential Indicators
		<ul style="list-style-type: none"> • Reduction of non-complying equipment available • Assessment of progress relative to implementation plan goals in 2010 • Assessment of progress in 2011 relative revised implementation • Periodic CPUC C&S compliance assessment indicating future program progress
22	As market share of high efficiency models increases, more products sold automatically meet the code requirement and compliance increases	<ul style="list-style-type: none"> • Increased market penetration of efficient products improved compliance rate
23	Compliance with new standards leads to C&S allocated energy savings and reduced greenhouse gas emissions	<ul style="list-style-type: none"> • Revised energy savings calculations with actual compliance rates over time
24	Code enforcement leads to increased code compliance	<ul style="list-style-type: none"> • Enforcement actions for improved compliance • Improved compliance rate
25	With time, natural market adoption and code enforcement will ensure maximum code compliance	<ul style="list-style-type: none"> • All appliances sold meet standards • All new buildings meet standards • Maximum market penetration achieved
26	100% code compliance results in maximum energy savings achieved	<ul style="list-style-type: none"> • Revised energy savings calculations with increased compliance rate
27	Code adoption makes efficient products cheaper and no longer a high profit margin product for the manufacturer, leading to new innovative technologies	<ul style="list-style-type: none"> • Development of new, more energy-efficient products

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C&S Federal Appliance Standards Advocacy Theory and Indicators

Link	Program Theory	Potential Indicators
1	C&S staff reaches out to stakeholders to gather industry data and inform them about the DOE rulemaking.	<ul style="list-style-type: none"> Communications log with industry stakeholders, including email records and conference call minutes
2	Due to C&S outreach and communications with industry stakeholders, more stakeholders are involved in the rulemaking process.	<ul style="list-style-type: none"> Stakeholder involvement in DOE process, including number of comments filed and attendance at DOE workshops and hearings
3	Due to C&S outreach, industry stakeholders that are supportive of federal standards are more involved in the DOE rulemaking and advocate for the standard.	<ul style="list-style-type: none"> Stakeholder involvement in DOE process Stakeholder coordination with efficiency advocates and involvement in joint proposal development
4	C&S advocacy for Title 20 standards in California, including thorough research and a code change proposal, often results in the CEC enacting a new or revised standard.	<ul style="list-style-type: none"> Final Title 20 standards adopted and supporting CASE reports
5	During the development of Title 20, IOUs draft a CASE report, which includes proposed code change language.	<ul style="list-style-type: none"> Final CASE report and supporting documents
6	DOE considers California's standard in the development of a federal standard.	<ul style="list-style-type: none"> DOE consideration of adopting California appliance standards at the federal level
7	DOE uses the CASE report developed by the C&S team to support their standards efforts.	<ul style="list-style-type: none"> Citation of CASE materials in the Rulemaking Framework
8	C&S staff conducts thorough market and technology research specifically for the DOE rulemaking process.	<ul style="list-style-type: none"> Research documentation and analysis in reports and internal communications
9	As part of C&S advocacy to DOE, staff analyzes DOE's documents, including performing additional technical and market data analysis.	<ul style="list-style-type: none"> Research documentation and analysis in written comments and communication with DOE staff
10	IOUs use their analysis of DOE documents to inform written comments and communications with DOE staff.	<ul style="list-style-type: none"> Written comments and internal communication regarding the DOE rulemaking
11	IOUs draft independent comments to submit to DOE to advocate for the standard and works directly with DOE staff during the rulemaking.	<ul style="list-style-type: none"> Submission of written comments from IOUs Communications, including emails and phone records, with DOE staff Percentage of DOE rulemakings for which comments are submitted
12	DOE staff considers IOU written comments and direct communications during their rulemaking process and in making their final rule.	<ul style="list-style-type: none"> Integration or citation of IOU comments in DOE rulemaking documents
13	C&S staff attends and participates in DOE hearings.	<ul style="list-style-type: none"> DOE hearing transcripts and attendance records IOU presentations at DOE hearings and workshops

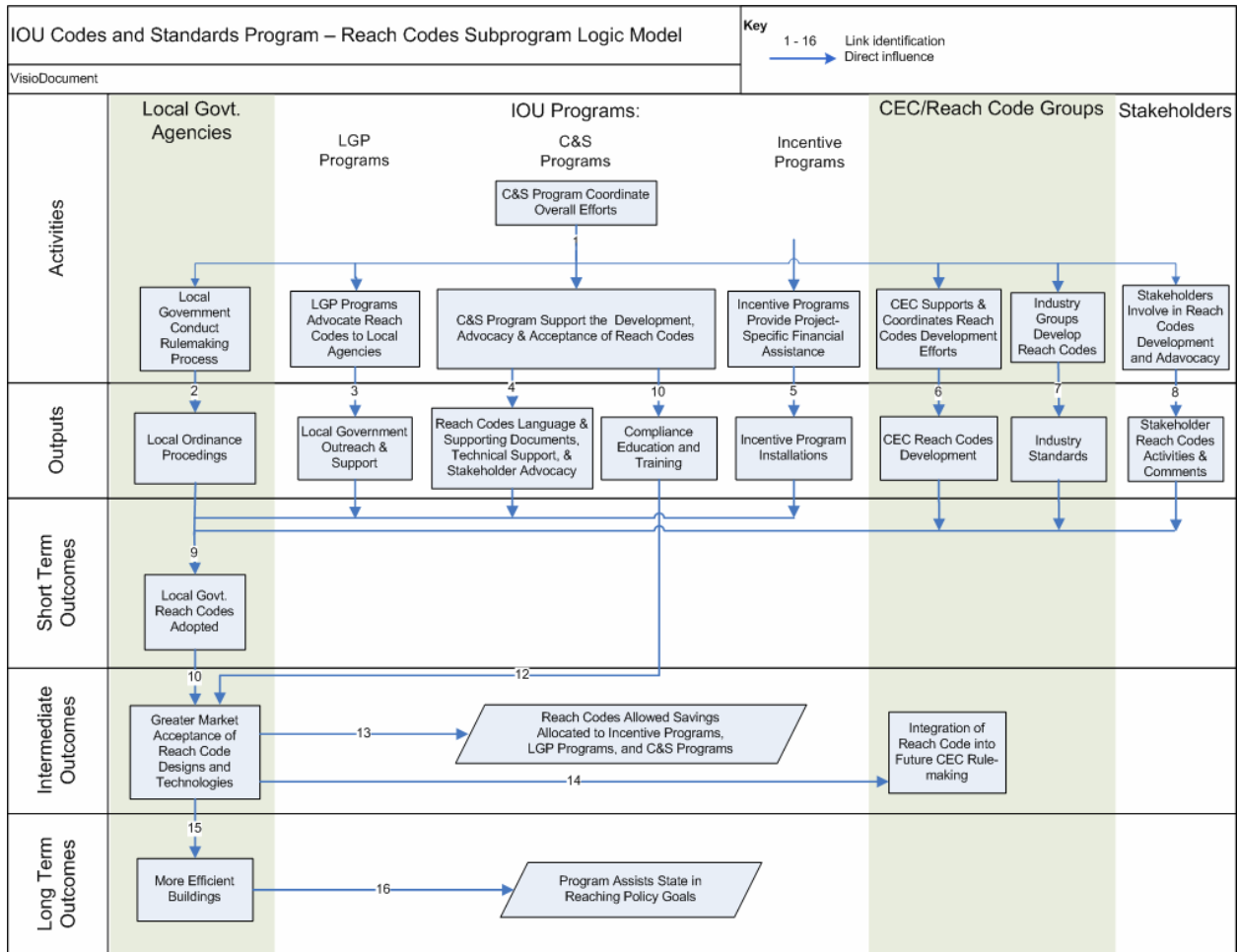
Codes and Standards

Link	Program Theory	Potential Indicators
		<ul style="list-style-type: none"> • Percentage of DOE workshops attended
14	DOE staff considers IOU participation in hearings during their rulemaking process and in making their final rule.	<ul style="list-style-type: none"> • Integration or citation of IOU presentations in DOE rulemaking documents
15 & 16	As a significant part of IOU advocacy to DOE, IOUs coordinate with other energy-efficiency advocates to submit a joint proposal with industry to DOE.	<ul style="list-style-type: none"> • Communications with stakeholders • Drafts of proposal offers • Proposal submitted to DOE • Percentage of DOE rulemakings for which comments are submitted
17	DOE uses a joint proposal from industry and efficiency advocates as the basis of their final rule.	<ul style="list-style-type: none"> • Proposal considered by DOE integrated into rulemaking documents
18 & 19	IOUs coordinate with other energy-efficiency advocates and industry stakeholders to submit a joint proposal to Congress.	<ul style="list-style-type: none"> • Communications with stakeholders • Proposal submitted to Congress
20	Congress accepts the principles of the joint proposal and directs DOE to conduct a rulemaking.	<ul style="list-style-type: none"> • Proposed legislative act directs DOE to action
21	Congress directs DOE to conduct a rulemaking and establish federal standards.	<ul style="list-style-type: none"> • Proposed legislative act directs DOE to action
22	Congress accepts the joint proposal and passes legislation to enact a federal standard directly.	<ul style="list-style-type: none"> • Proposed legislation borrows from the submitted proposal
23	Congress adopts a California Appliance Standard as a Federal Standard	<ul style="list-style-type: none"> • Proposed legislation borrows from California's Title 20 Appliance Standards
24	Due to C&S outreach, industry stakeholders that are supportive of federal standards advocate for the standard.	<ul style="list-style-type: none"> • Stakeholder involvement in federal process and advocacy to Congress
25	DOE passes a final rule establishing or updating a standard and California updates Title 20 to include the new standard.	<ul style="list-style-type: none"> • Publication of a Final Rule • Update of Title 20 with the new Federal Standard
26	Congress passes legislation establishing or updating a standard and DOE publishes the standard in a final rule.	<ul style="list-style-type: none"> • Proposed legislative act sets minimum efficiency standards • DOE final rule with new standard
27	The establishment of Federal standards, adopted into Title 20, results in significant energy savings in California.	<ul style="list-style-type: none"> • Energy savings estimates
28	IOUs develop Extension of Advocacy and Compliance Improvement Programs to enhance compliance with the new standards.	<ul style="list-style-type: none"> • Development of Extension of Advocacy and Compliance Improvement Programs supporting newly adopted federal standards.
29	Improved compliance with Federal standards, adopted into Title 20, results in significant	<ul style="list-style-type: none"> • Energy savings estimates

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Link	Program Theory	Potential Indicators
	energy savings in California.	

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C&S Reach Codes Sub-program Theory and Indicators

Link	Program Theory	Potential Indicators
1	C&S program coordinates and support internal and external efforts to drive reach codes development and adoption, using the resources offered by the Incentive and Local Government Partnership Programs, working with the CEC, Industry Groups, and other stakeholders	<ul style="list-style-type: none"> • C&S program coordinate efforts with local government agencies in conducting rulemaking process • C&S program coordinate reach code features with incentive program offerings where possible • C&S program and LGP coordinate outreach efforts to local jurisdictions • C&S program coordinates with the CEC and provide technical support in development of statewide reach codes solutions • C&S program supports the standards development by industry groups, such as ASHRAE, LEED, CHPS, etc. • C&S program efforts in seeking stakeholder involvement and working with stakeholders, and responses to stakeholder feedback
2	Local governments conduct rulemaking process, resulting in ordinance proceedings	<ul style="list-style-type: none"> • Local ordinance proceedings are conducted
3	LGP provides outreach and information to local governments in conducting energy-efficiency activities and policies.	<ul style="list-style-type: none"> • LGP establishes outreach to local agencies for the C&S program to initiate reach codes program participation • Increase in regional code consistency (countywide or geographically contiguous jurisdictions)
4	C&S program helps to develop energy efficient reach codes and advocate reach codes to local government officials and stakeholders	<ul style="list-style-type: none"> • C&S program develops statewide reach code templates to streamline the reach code adoption and compliance support • C&S program provides technical support to individual local reach code development and adoption • C&S program responds to comments from local government officials and stakeholders • Advocacy material and C&S program

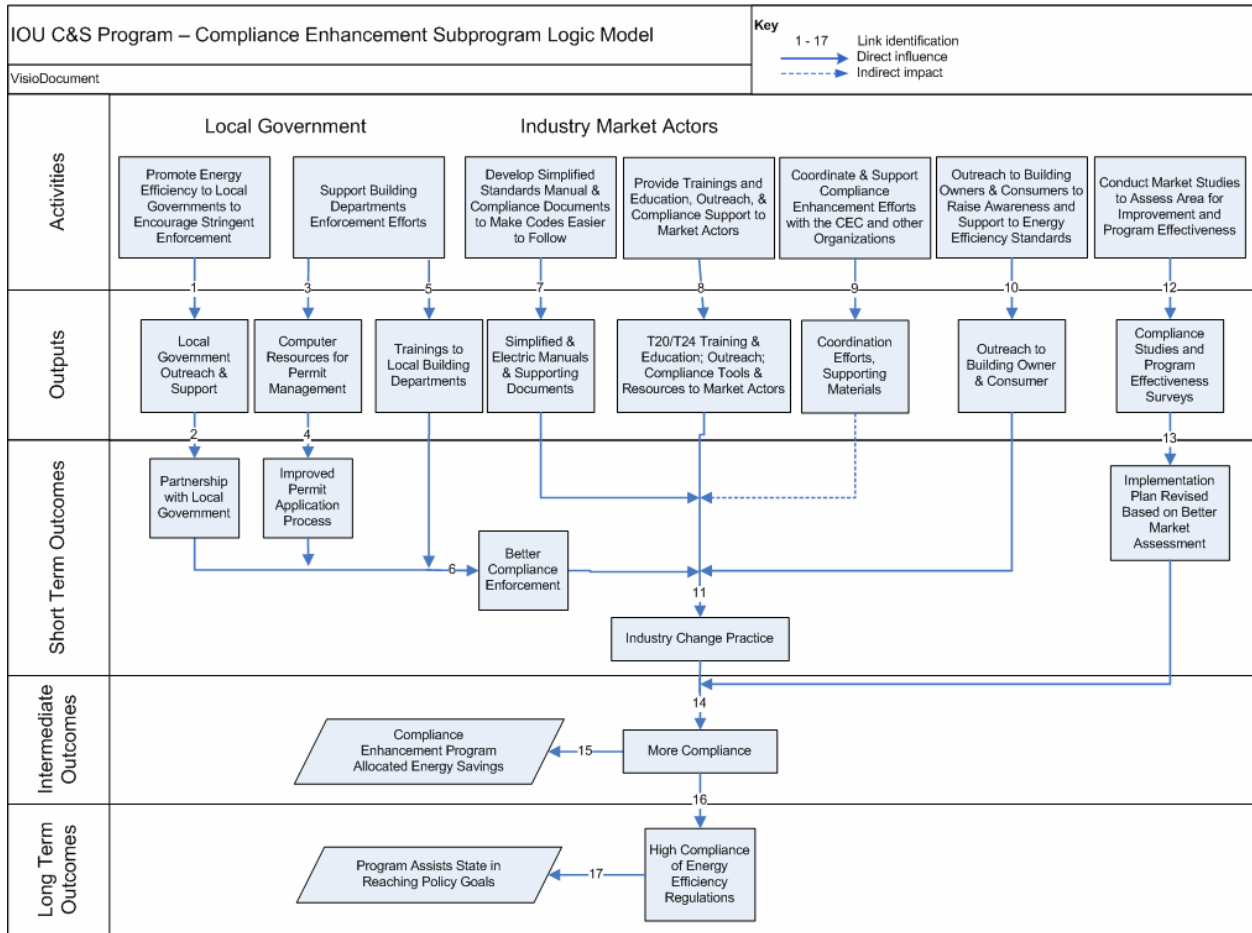
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Link	Program Theory	Potential Indicators
		supported advocacy activities
5	Incentive programs provide financial assistance for purchasing efficient measures, thereby reducing the financial barrier to reach codes acceptance and compliance	<ul style="list-style-type: none"> • Market share of the new, efficient technologies • Market acceptance of and compliance with reach codes requirements
6	With the support from C&S program, CEC develops pre-approved model reach codes so as to eliminate duplicative local government development costs and facilitate subsequent adoption of the code	<ul style="list-style-type: none"> • Adoption of CEC-approved model reach codes by local governments • C&S programs supports to CEC reach codes efforts
7	Industry groups develop energy efficient codes, which are strongly supported by IOU C&S efforts	<ul style="list-style-type: none"> • Industry energy-efficiency standards, such as ASHRAE, LEED, CHPS standards. • C&S program support and contribution to industry standards
8	Stakeholders contribute to reach code development and adoption by local government; some stakeholders might try to hinder reach codes development and adoption	<ul style="list-style-type: none"> • Stakeholder efforts in reach code development • Stakeholder comments and activities to advocate and resist reach code development and adoption
9	Support from the IOU programs, CEC, and industry groups causes increased willingness and acceptance of reach codes from local government partners.	<ul style="list-style-type: none"> • Local government partners adopt pre-approved model reach codes
10	Reach codes create greater market acceptance of required technologies and/or building designs by forming a greater market base for reach code technologies and expertise, which will spillover to non-participating jurisdictions	<ul style="list-style-type: none"> • Growing market share of reach codes required technologies and building design in other local jurisdictions
11	C&S program educates stakeholders on code requirements	<ul style="list-style-type: none"> • Implementation of training courses and development of education materials • Training materials, compliance tools and resources provided by the C&S

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Link	Program Theory	Potential Indicators
		program
12	Education & training courses addressing construction of code compliant buildings and appliances increases industry code awareness and knowledge	<ul style="list-style-type: none"> • Market acceptance of reach codes requirements
13	Adoption of reach codes leads to the greater practice of more efficient building design and purchasing of efficient technologies	<ul style="list-style-type: none"> • Reach codes energy savings are verified and can be attributed to the involved IOU programs
14	Development of locally adopted reach code ordinances leads to integration of code language into future CEC Rule-making	<ul style="list-style-type: none"> • Future CEC Title 24 code change proposal and CASE studies based on - adopted reach codes • Increased market share of reach code practices and spillover into other jurisdictions and states
15	Adoption of reach code ordinances leads to the greater practice of more efficient building design	<ul style="list-style-type: none"> • Reach codes requirements become standard building design practices
16	Efficient building design practices support statewide policy efficiency and sustainable goals	<ul style="list-style-type: none"> • Improvement in overall building energy efficiency • Statewide greenhouse gas reduction attributable to reach codes

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C&S Compliance Enhancement Sub-program Theory and Indicators

Link	Program Theory	Potential Indicators
1	Promote energy efficiency and pro-environment policies to local government staff, regional organizations, enforcement personnel, and leadership to increase awareness of compliance rates with existing codes and the savings potential	<ul style="list-style-type: none"> Local government leadership and enforcement personnel recognize benefits and prioritize and support activities to optimize existing codes
2	Establish partnership with local government to improve code compliance and overall building efficiency	<ul style="list-style-type: none"> Local government enforcement personnel develop a strategy for improving code compliance through education and training
3	Identify existing successful tools used by leading local governments. Based on feedback from local governments, develop new tools and/or provide existing tools to local building departments to improve permit application, tracking, and inspection processes, and increase regional consistency	<ul style="list-style-type: none"> Existing standard practices and processes in building departments Increase in number of building departments that adopt and use tools identified as industry best practices
4	Permit application tools streamline and improve building department processes and provide effective methods to archive permit and inspection data	<ul style="list-style-type: none"> Reduction in time for building officials to process paperwork Availability of permit data Reduction in number of compliance mistakes due to the tool Feedback from building department staff and permit applicants on the permit application processes
5	Create and provide role-based training to building department staff focusing on new Title 24 requirements	<ul style="list-style-type: none"> Number of building department training sessions conducted Percent increase in standards knowledge (pre- and post tests)
6	Better compliance enforcement is achieved through improved building department processes, tools, and staff training	<ul style="list-style-type: none"> Improvement of compliance rate after adopting tools Increase in enforcement activity and compliance rates after receiving training
7	Develop simplified compliance documentation forms to streamline	<ul style="list-style-type: none"> Increase in enforcement activity after adopting simplified compliance forms

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Link	Program Theory	Potential Indicators
	building permit applications	<ul style="list-style-type: none"> • Improvement of compliance rate after adopting simplified compliance forms
8	Provide comprehensive training and outreach programs targeting builders, contractors, designers, retailers, manufacturers and distributors on T20/T24 requirements.	<ul style="list-style-type: none"> • Detailed training curriculum and outreach materials • Number of training classes offered • Number of contractors, builders, designers, retailers, manufacturers and distributors attending training sessions or receiving standards information • Increase in knowledge level of training attendees
9	Coordinate and support training and outreach activities with CEC and other organizations Write articles for CEC Blueprint and other publications addressing T20/T24 requirements	<ul style="list-style-type: none"> • Number of training sessions coordinated with other organizations • Number of articles published addressing T20/T24 requirements
10	Improve consumer awareness of T20/T24 requirements for targeted measures.	<ul style="list-style-type: none"> • Increased demand for and market penetration of efficient products
11	Better code enforcement by local building departments improves industry practice Simplified T24 compliance documentation process provided to building departments improves compliance enforcement Trainings and outreach programs to stakeholders increases market actor awareness and understanding of T20/T24 requirements Consumer awareness of building and appliance codes is improved by education and outreach programs	<ul style="list-style-type: none"> • Increase in number of contractors/builders that comply with the T24 requirements. • Increase in number of products that comply with the T20/T24 requirements. • Improved compliance review after compliance documentation simplification • Positive response to outreach and demand for training and code-related information • Increase in compliance rates
12	Periodic market studies inform program design refinements and adjustments	<ul style="list-style-type: none"> • Completion of market penetration compliance study for T20/T24
13	Market studies provide information on compliance effectiveness Market studies provide information	<ul style="list-style-type: none"> • Market study results of compliance effectiveness per appliance for Title 20 • Market study results of compliance

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Link	Program Theory	Potential Indicators
	for improving compliance enhancement activity effectiveness	<p>effectiveness per measure or overall building design for Title 24</p> <ul style="list-style-type: none"> • Market study recommendations for further program activities to improve compliance effectiveness
14	Compliance is improved due to practice changes by industry stakeholders	<ul style="list-style-type: none"> • Increase in compliance rate for new buildings, remodeling, renovations, and additions • Increase in compliance rate for regulated appliances
15	Compliance Enhancement Program activities leads to the greater practice of more efficient building design and purchasing of efficient technologies	<ul style="list-style-type: none"> • Compliance Enhancement Program energy savings are verified and can be attributed to the C&S programs
25	Program will allocate resources on areas that are likely to be the most effective in increasing the compliance rate	<ul style="list-style-type: none"> • Compliance rate improvement for new buildings • Compliance rate improvement for remodeling, renovations, and additions
16	More effective enforcement processes, increased knowledge of code requirements throughout the market increases compliance rate.	<ul style="list-style-type: none"> • T24 compliance rate increases are sustained
17	Efficient building design practices support statewide policy efficiency and sustainable goals	<ul style="list-style-type: none"> • Improvement in overall building energy efficiency

Codes and Standards

Appendix 1 Glossary of Acronyms

Acronym/Term	Description
AB 32	California Assembly Bill AB 32, California Global Warming Solutions Act of 2006
ACM	Alternate Component Method, The CEC's Public Domain Computer Programs, one of the CEC's Simplified Calculation Methods, or any other calculation method approved by the CEC.
AHRI	Air-Conditioning, Heating and Refrigeration Institute
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers
ASHRAE 90.1	Energy Standard for Buildings Except Low-Rise Residential Buildings
ASHRAE 189	Standard for the Design of High-Performance, Green Buildings Except Low-Rise Residential Buildings
ASTM	American Society for Testing and Materials Now referred to as ASTM International
BSC	California Building Standards Commission
C&S	Codes and Standards program
CA	California
CABEC	California Association of Building Energy Consultants
CALBO	California Building Officials
CARB	California Air Resources Board
CASE	Codes and Standards Enhancement
CE	Code Enhancement Sub-program
CEC	California Energy Commission
CEE	Consortium for Energy Efficiency
CEPs	Compliance Enhancement Programs
CEQA	California Environmental Quality Act
CHPS	Collaborative for High Performance Schools
CPUC	California Public Utilities Commission
CRRC	Cool Roof Rating Council
CSLB	California State License Board
CSU	California State University
DOE	United States Department of Energy
DCA	California Department of Consumer Affairs
DR	Demand Response
DTSC	California Department of Toxic Substance Control
DSA	California Division of State Architect
DWR	California Department of Water Resources
EE	Energy Efficiency
EISA 2007	United States Energy Independence and Security Act of 2007
EOA	Extension of Advocacy
EPA	United States Environmental Protection Agency

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Acronym/Term	Description
ET (ETP)	Emerging Technologies (Emerging Technologies Program)
FDD	Fault Detection and Diagnostics
GHG	Greenhouse Gas
Green Globes	Green building rating system as administered by the Green Building Initiative
HCD	California Department of Housing and Community Development
HERS	Home Energy Rating System
HID	High Intensity Discharge
Huffman Bill (AB1109)	California Assembly Bill AB 1109, Lighting Efficiency and Toxics Reduction Act
HVAC	Heating, Ventilating and Air Conditioning
IBEW	International Brotherhood of Electrical Workers
ICC	International Code Council
IESNA	Illuminating Engineering Society of North America
IOU	California Investor Owned Utility (PG&E, SCE, SDG&E, SCG)
LAUSD	Los Angeles Unified School District
LEED	Leadership in Energy and Environmental Design Green building rating system as administered by the USBGC
LG	Local Government
LGC	Local Government Commission
M&V	Measurement and Verification
NECA	National Electrical Contractors Association
NFRC	National Fenestration Rating Council
NRDC	National Resources Defense Council
OSHPD	California Office of Statewide Health Planning and Development
PG&E	Pacific Gas and Electric
RC	Reach Code
Reach Code	Codes, standards, regulations, policies and programs that exceed minimum energy codes such as Title 24, Title 20, ASHRAE Standard 90.1, etc.
ResNet	Residential Energy Services Network
SCE	Southern California Edison
SCG	Southern California Gas
SDG&E	San Diego Gas and Electric
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SMUD	Sacramento Municipal Utility District
T-20	Title 20, California Appliance Efficiency Regulations, Section 1601 et seq. of the California Code of Regulations.
T-24	Title 24, California Building Energy Efficiency Standards, as set forth in the California Code of Regulations, Title 24, Part 6. Also known as the <i>California Energy Code</i> .
TDV	Time Dependent Valuation is the time varying energy caused to be used at by the building to provide space conditioning and water heating and for specified buildings lighting, accounting for the energy

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Acronym/Term	Description
	used at the building site and consumed in producing and in delivering energy to a site, including, but not limited to, power generation, transmission and distribution losses.
TOS	Time of Sale
UC	University of California
USGBC	United States Green Building Council
WE&T	Workforce, Education and Training

9

Emerging Technologies

1. **Program Name:** Emerging Technologies Program (ETP)
Program ID: SCE-SW-009
Program Type: Core

2. Projected Program Budget Table

Table 1: Projected Program Budget Estimates (SCE)

	Direct Impl.	Admin	Marketing & outreach	Total Budget
Total ET program*	\$17,099,990	\$ 4,240,994	\$ 1,560,015	\$22,901,000
Assessments	\$ 6,907,857	\$ 1,460,242	\$ 659,901	\$ 9,028,000
Scaled field placement	\$ 2,883,641	\$ 574,223	\$ 94,136	\$ 3,552,000
Demonstration / showcasing	\$ 3,295,629	\$ 689,667	\$ 277,705	\$ 4,263,000
Market and behavioral studies	\$ 718,647	\$ 147,285	\$ 47,068	\$ 913,000
Technology supply-side efforts	\$ 496,890	\$ 122,902	\$ 141,207	\$ 761,000
Incubation	\$ 474,000	\$ 621,000	\$ 190,000	\$ 1,285,000
Technology Test Centers (TTC) — SCE incl. new ZNE Test Center	\$ 1,661,326	\$ 625,675	\$ 149,999	\$ 2,437,000
Program Management & CPUC Reporting	\$ 662,000			\$ 662,000

*Note: Administrative costs in addition to exhibited program element costs.

3. Program Mission

The mission is to support increased energy efficiency market demand and technology supply (the term supply encompassing breadth, depth, and efficacy of product offerings) by contributing to development and deployment of new and under-utilized energy efficiency (EE) measures (that is, technologies, practices, and tools), and by facilitating their adoption as measures supporting California's aggressive energy and demand savings goals.

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Increased market demand and increased technology supply are reinforcing effects – each working to spur the other. As market demand increases, market-pull leads to technology supply increases. As technology supply increases, changes in perceptions and attitudes, work to stimulate increased market demand.

Increased market demand works to address energy efficiency goals in both the near term and longer term. In the near term, increased market demand will lead to higher adoption rates of currently available energy efficiency measures. Market demand can be increased by either reducing barriers to adoption or through increasing incentives to adopt. In either case, as barriers (disincentives) shrink relative to incentives, adoption rates will grow. One example of a barrier to EE measure adoption is performance uncertainty, where an incentive example is an environmental concern.

A longer-term effect of increased market demand for EE measures is the spurring of market pull for yet-to-be-developed EE measures. Generally, market-pull product development usually takes place when some specific need is discovered in the marketplace that currently is either being ignored, not well served, or just not recognized. As technology developers become aware of unmet consumer needs for EE measures, development will be undertaken to fulfill those needs in the future. Market pull created by increased market demand will result in longer-term increases in technology supply.

Increased technology supply also works to address energy efficiency goals in both the near term and longer term. In the near term, increased technology supply will lead to more EE measure adoption at current levels of market demand. Factors contributing to this increase would be more applications for which EE measures are available, lower prices due to competition, and increased measure effectiveness. Technology can generally be increased through improving incentives to invest in new measures or decreasing the difficulty of developing and launching new measures. In either case, as difficulty shrinks relative to incentive, development of new technology supply will grow. One example of decreasing the difficulty of developing an EE measure is a pre-existing testing protocol. An example of incentive to invest in a new technology is a building code driving future customer purchases.

A longer-term effect of increased technology supply of EE measures is the development of future market demand. Generally, as breadth, depth, and efficacy of available products in a new market segment increases, consumer perceptions and attitudes will change. Items previously viewed as niche become more mainstream. Energy usage considerations will become a more expected aspect of the products consumers purchase. In this way, increases in technology supply will result in longer-term increases in market demand. The ETP has established three goals and eleven objectives as the means to achieve its mission. Section 5 of this PIP elaborates these goals in detail.

ETP Goal #1: Increased adoption of EE measures (increased market demand)

ETP Objective 1.1: Perform technology assessments

ETP Objective 1.2: Transfer measures to EE programs

ETP Objective 1.3: Conduct scaled field placements

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ETP Objective 1.4: Develop demonstration showcases

ETP Objective 1.5: Perform market and behavioral studies

ETP Goal#2: Increased EE technology supply (increased technology supply)

ETP Objective 2.1: Support technology development

ETP Objective 2.2: Perform business incubation

ETP Goal #3: Support of the Strategic Plan and related solutions, including zero net energy (ZNE)

ETP Objective 3.1: Advance innovative measures and/or strategies

ETP Objective 3.2: SCE Technology Test Centers activities including create ZNE test facility

ETP Objective 3.3: Create the PG&E ZNE Laboratory

ETP Objective 3.4: Create the PG&E ZNE Demonstration Home

By advancing these goals and objectives, the ETP supports California's energy and demand savings targets as defined by the following regulatory and legislative documents:

- The 2009-2011 Energy Efficiency (EE) Application 08-07-021, et. al. and related CPUC guidance in Rulemaking 06-04-010;
- The California Long Term Energy Efficiency Strategy (Strategic Plan), with particular focus on the big, bold initiatives in the domains of residential and commercial ZNE buildings, HVAC industry transformation, as well as lighting innovation; and
- The California Global Warming Solution Act of 2006 (Assembly Bill 32).

The ETP will leverage all complementary efforts and entities in support of its mission, including other statewide and local IOU EE programs; statewide utilities' emerging technologies programs; and EE innovation activities by external organizations such as private industry, industry trade organizations, corporate laboratories, CEC PIER, U.S. DOE and national laboratories, and regional, national and international ETP partners including utility, academia, non-governmental organizations, and other market stakeholders.

Section 4 of this PIP describes the rationale for and expected outcome from the ETP in relation to market and technology barriers and the Strategic Plan. Six program elements central to the ETP's ability to address its mission and achieve its goals and objectives are also described in Section 4, below. These program elements drive the process of evaluating the application of energy-saving measures in real-world settings and building a pipeline of measures to consider for deployment through utility EE programs.

4. Program Rationale & Expected Outcome

California consumers report they are eager for solutions to climate change and other environmental issues, and California's IOUs have implemented a vast array of programs to support the purchase and use of EE measures. Many of these programs have seen tremendous success, yielding energy and demand savings that have reduced the need for new generation, transmission, and distribution facilities, lowered ratepayer energy bills, and avoided tons of greenhouse gas emissions.

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To meet California's ambitious EE goals, new measures must be added to ensure program success in 2009-2011, and beyond. However, a host of market barriers can delay new measure introduction and adoption. Delayed adoption in turn diminishes, slows, or even eliminates the potential energy and environmental benefits of new measures, as well as the attractiveness of investing in and developing these measures.

To achieve success, the ETP will focus its operations on six core program elements. Each of these elements are briefly presented within section 4 of the program implementation plan.

1. **Technology Assessments**
2. **Scaled Field Placements**
3. **Demonstration Showcases**
4. **Market and Behavioral Studies**
5. **Technology Development Support**
6. **Business Incubation Support**

Note: Although a key element, SCE's Technology Test Centers are not presented within this PIP as a core element. Please refer to Section 8e for narrative of this subprogram element.

a) Program Design to Overcome Barriers

The ETP focuses on overcoming four priority market and technology barriers:

- A. Information or search costs** - the value of time spent identifying, learning about, and locating EE measures.
- B. Performance uncertainties** – the difficulties and costs of acquiring the information needed to evaluate performance claims for EE measures.
- C. Organizational practices or customs** – behavior by companies, departments, professional groups, and government entities that has been institutionalized and may discourage forward thinking and proactive implementation of EE measures.
- D. Product or service unavailability** – limited supply and/or distribution of EE measures. For instance, a customer may want to buy task lights using solid-state lamp technology, but finds that vendors and distributors cannot meet the customer's volume requirements or other specifications.

In addition, other EE programs and market factors will have responsibility for, and ETP will contribute to, actions to overcome the following customer barriers.

- **Hidden costs** – unexpected costs emerging after the initial decision to implement an EE measure. For instance, a hidden cost under the Big, Bold strategies would be the expense of training contractors on new types of lighting or HVAC measures.
- **Asymmetric information and opportunism** – concerns about reliability/applicability of measure developer and vendor claims. Collaborating with the work of universities and technical information providers, such as E Source, the ETP can act as a resource to assist EE programs in addressing these claims.

The statewide IOUs' expansion of the ETP scope for 2009-2011 to include six program elements represents a response mindful of insights from previous ETP program years and

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past ETP EM&V studies. The IOUs will apply these program elements in a comprehensive effort to address the range of EE market barriers that ETP can either influence directly or through efforts supporting other EE and IDSM programs. Following are descriptions of the six ETP elements with supporting rationale, how each contributes to overcoming one or more market or technology barriers, and expected outcomes.

1. Technology Assessments

- a. Energy efficient measures that are new to a market or under-utilized for a given application will be evaluated for performance claims and overall effectiveness in reducing energy consumption and peak demand.

ET assessments may utilize data/information from three different sources: *in situ* testing (customer or other field sites), laboratory testing, or paper studies may be used to support assessment findings. In addition to other findings and/or information, assessments typically would generate the data necessary for EE rebate programs to construct a work paper estimating energy and demand savings over the life of the measure.

Assessment proposals are screened before an assessment is initiated. The screening process considers:

- The measure's alignment with EE program strategy and Strategic Plan goals;
- The measure's projected magnitude of contribution towards kWh and kW reduction and/or Strategic Plan goals. This includes both the effectiveness of an individual measure and the potential number of adopted measures;
- The degree to which the assessment output will incrementally impact the measure's adoption rate;
- Information necessary to be generated for EE program inclusion and the effectiveness of an assessment in producing this information; and
- Resources (expense, labor) necessary to execute the assessment.

To ensure that technology lab assessments can be conducted properly, state-of-the-art test facilities staffed with knowledgeable engineers and scientists will be available to ETP project managers. These facilities will be focused toward broad initiatives like ZNE, as well as specific end-uses, such as refrigeration, lighting, water heating, and air conditioning. In all respects, they will allow independent verification of performance claims and quantification of energy and demand savings.

- b. Rationale

The assessment function is a contributor to the transfer of promising measures into the utility portfolio.

- c. Barriers addressed

Assessments address information or search costs, performance uncertainties, organizational practice or customs, as well as contributing to efforts by others to overcome hidden costs and asymmetric information and opportunism.

For instance, assessment reports reduce the time that IOU customers must spend looking for and confirming the performance of EE measures – either directly

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when the customer reads the ETP report, or indirectly, when the customer receives education or marketing material through EE channels based on ETP assessment findings.

Similarly, ETP communications on measures that are being transferred or have been transferred to EE programs will assist companies, departments, and governmental entities in understanding EE measures' actual performance, thereby breaking down barriers to proactive implementation.

d. Expected outcomes

Technology assessments will contribute to increased measure awareness, market knowledge and reduced performance uncertainties for ETP stakeholders and IOU customers. This will lead to changes in organizational practices and customs that may otherwise limit EE measure procurement and application.

Technology assessments will also contribute to increased and improved technology supply, leading to further reductions in market barriers, increased intent to purchase/employ measures, and more EE rebates issued. Over time, they will support increasing use of measures by customers, aiding EE programs in achieving energy and demand savings targets, and meeting long term Strategic Plan and policy objectives.

2. Scaled Field Placements

- a. These projects consist of placing a number of measures at customer sites as a key step to gain market traction and possibly gain market information. The measures will typically have already undergone an assessment or similar evaluation to reduce risk of failure. While the number of units in scaled field placements will vary widely, numbers typically larger than in an assessment of the technology are expected. A very simple example of a scaled field placement is to give 50 office managers an LED task light. Monitoring activities on each scaled field placement will be determined, as appropriate.

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The following table highlights the distinctions between technology assessments, scaled field placements, and demonstration showcase.

<i>Parameter</i>	Technology Assessments	Scaled Field Placements	Demonstration Showcases
<i>Purpose</i>	performance, cost data → EE programs	market traction	Visibility
<i>Theme</i>	evaluation	first-hand experience	Exposure
<i>Units installed</i>	one to a few (exceptionally, many)	a few to many	one (or entire floor/building/facility)
<i>Number or sites</i>	one to a few (exceptionally, many)	a few to many	One or more as strategically valuable
<i>Unique measures</i>	One	one	more than one measure up to whole systems (exceptionally, just one)
<i>Customer impact</i>	one or a few users	few to many users	large number of viewers
<i>Visibility</i>	very little	targeted	Public
<i>Duration</i>	as needed for data collection	life of measure	duration of public interest / impact
<i>Data collection</i>	Detailed	none to moderate	none to moderate
<i>Dissemination mechanism</i>	printed report & other media	first-hand experience and word of mouth	short-term exposure and word of mouth

b. Rationale

Scaled field placements work under the premise that end-users or stakeholders with adoption influence (installers, builders, procurement officers) will be positively influenced by first-hand experience utilizing a measure and that this first-hand experience will lead to future measure purchases/use. This method of influence is fundamentally different from assessments that influence through information dissemination via a report or other results media.

Scaled field placements will be most effective when:

- The stakeholder gaining exposure has the potential to influence a large number of future purchases/uses. Example: Placing a high-efficiency air conditioning unit with several large HVAC contractors. “Potential to influence” is a broad term. Influence of the participant stakeholder could stem

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from purchase decision power, high frequency of interactions with other potential adopters, or status as a thought leader; and

- First-hand experience is projected to be more influential for a measure than less costly dissemination mechanisms such as printed information or media. Technology complexity and concern regarding human factors are potential causes for first-hand experience to be more influential than printed media. Example: Placing energy efficient retail lighting at a Wal-Mart, Target, and Home Depot store.

c. Barriers addressed

Scaled field placements address Information or search costs, performance uncertainties, organizational practice or customs, as well as contributing to efforts by others to overcome hidden costs and asymmetric information and opportunism. For instance, scaled field placements reduce the time that large-scale decision makers and decision influencers must spend looking for and confirming the performance of EE measures – as first-hand experience eliminates these needs.

d. Expected outcomes

Scaled field placements will contribute to increased measure awareness, market knowledge and reduced performance uncertainties for ETP stakeholders and large scale customer decision makers and decision influencers. This will lead to changes in organizational practices and customs that may otherwise limit EE measure procurement and application.

Scaled field placements can also contribute to a market tipping point, in which an influential buyer or decision maker responsible for large volume purchase decides to specify the EE measure – thus creating a spike in market demand and exposure for many people who experience the measure once it is implemented. Over time, scaled field placements may support increasing use of measures by customers, aiding EE programs in achieving energy and demand savings targets, and meeting long term Strategic Plan and policy objectives.

3. Demonstration Showcases

- a. These possibly large-scale projects will expose measures to various stakeholders utilizing *in situ*, real-world applications and installations. Monitoring activities on demonstration showcases will be determined, as appropriate. For instance, a demonstration showcase for ZNE residential or commercial new construction or for a ZNE existing building could take a form similar to projects performed as part of the Advanced Customer Technology Test for Maximum Energy Efficiency (ACT2) project in California 1990, creating broad public and technical community exposure. Another example would be a demonstration showcase residential or commercial building highlighting LED lighting technologies to create visibility and market awareness for building contractors, architects, and electricians.

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Key attributes of a demonstration showcase is that it is open to the public or to an interest group (for example, a super-low energy data center that is open to data center industry professionals), that many viewers are encouraged to visit, and that may highlight a systems approach rather than an individual measure (this last point is optional, as in the case of the previously cited LED lighting showcase). The actual number of customers or viewers exposed to the showcase will depend on the technologies being demonstrated, market segment and other variables.

b. Rationale

Demonstration showcases provide a unique opportunity for measures and systems to receive broad exposure, and for numerous visitors to “kick the tires,” or at least experience the measure in an informal, real-world setting.

The combination of large numbers of customers and other stakeholders experiencing the measure with the opportunity to return to the showcase with friends, family, and professional associates, creates a powerful “conversion” experience that enhances diffusion and market penetration. Note that this is very different from the experience of being marketed to or being sold the measure in a purchasing environment.

c. Barriers addressed

Demonstration showcases address information or search costs, performance uncertainties, organizational practice or customs, as well as contributing to efforts by others to overcome hidden costs and asymmetric information and opportunism. For instance, demonstration showcases reduce the time that IOU customers must spend looking for and confirming the performance of EE measures – either directly, when the customer visits the demonstration showcase site, or indirectly, when the customer receives educational or marketing material through word-of-mouth or EE channels.

Similarly, in-person exposure, word-of-mouth, media or ETP / EE communications on demonstration showcase features, performance, and impressions will assist representatives of companies, departments, and governmental entities in gauging EE measures’ actual performance thereby breaking down barriers to proactive implementation.

d. Expected outcomes

Demonstration showcases will contribute to increased measure awareness, market knowledge and reduced performance uncertainties for ETP stakeholders and IOU customers. This will lead to changes in organizational practices and customs that may otherwise limit EE measure procurement and application.

Demonstration showcases, like scaled field placements, can contribute to a market tipping point, in which one or more influential “connectors” or “mavens” experiences and recommends the EE measure to many friends and colleagues – thus creating a spike in market demand and exposure for many more people who experience the measure once it is implemented. Over time, they will support

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increasing use of measures by customers, aiding EE programs in achieving energy and demand savings targets, and meeting long-term Strategic Plan and policy objective.

4. Market and Behavioral Studies

- a. These projects involve targeted research on customer behavior, decision making, and market behavior to gain a qualitative and quantitative understanding of customer perceptions, customer acceptance of new measures, and market readiness and potential for new measures.

Studies may involve primary research, such as studies of potential measure impacts and barriers, market segment needs and gaps, technology performance gaps, pre-studies to qualify potential measures and sites for scaled field placements and demonstration showcases, measure usability studies, long-term market potential studies for the ETP, and the like.

Specific examples of primary market and behavioral research include:

- User feedback gathered on high-efficiency HVAC units at big-box stores;
- Ethnographic studies to see how automated building system diagnostic applications would fit into daily operations at customer site;
- Lab-based observational studies of user behavior while using LED task lighting under controlled conditions;
- Usability studies for home energy monitoring and control systems; and
- Survey-based discrete choice analysis of features that customers prefer in high-efficiency appliances or industrial process controls.

Studies may also include secondary research based on the wealth of studies being conducted in the rapidly growing energy behavior field.

- b. Rationale

Measure adoption is often impacted by customer/market perception and acceptance. Market and behavioral analysis may identify potential barriers to adoption early in the process. Results can provide crucial insights at multiple points in technology development, assessment justification, and transfer to and deployment by EE programs. Additionally, market and behavioral studies may be executed independently of a specific measure where this information is valuable to identify new markets or segment opportunities, or to advance one or more of the ETP objectives in other ways.

- c. Barriers addressed

Market and behavioral studies address information or search costs, performance uncertainties, organizational practice or customs, as well as contributing to efforts by others to overcome hidden costs and asymmetric information and opportunism. For instance, market and behavioral study reports reduce the time that IOU customers must spend looking for and confirming the human factors performance aspects of EE measures – either directly, when the customer reads the ETP report,

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or indirectly, when the customer receives educational or marketing materials through EE channels based on ETP market and behavioral study findings. Similarly, ETP communications about market and behavioral studies for measures that are being transferred or have been transferred to EE programs will assist companies, departments, and governmental entities in understanding EE measures' actual performance, including human factors, breaking down barriers to proactive implementation. They can also help product developers and manufacturers identify and target unmet customer needs, thus enabling development and deployment of new or better products, such as efficient consumer electronics or CFLs that better meet customer expectations.

d. Expected outcomes

Market and behavioral studies will contribute to increased measure awareness, market knowledge and reduced performance uncertainties for ETP stakeholders and IOU customers. This will lead to changes in organizational practices and customs that may otherwise limit EE measure procurement and application. Market and behavioral studies will also contribute to increased and improved technology supply leading to further reductions in market barriers, increased intent to purchase/employ measures, and more EE rebates issued. Over time, they will support increasing use of measures by customers, aiding EE programs in achieving energy and demand savings targets, and meeting long term Strategic Plan and policy objectives.

5. Technology Development Support

a. The ETP will look for targeted opportunities to support energy efficiency product development. Product development is the process of taking an early-stage technology or concept and transforming it into a saleable product. (Early-stage technologies are often the output of R&D work, hence product development bridges the gap between R&D and the market.) An example of an early-stage technology is a light-emitting diode. The product development process has resulted in televisions, computer monitors, illuminated signs, and lighting fixtures.

b. Rationale

Product development is best performed by private industry. There are opportunities, however, where the IOUs are well qualified or in a strong position to undertake very targeted, cost-effective activities which provide value in support of private industry product development efforts. (Examples of activities include providing customer contacts for field evaluations, making lab testing facilities available to companies without this capability, or developing standard testing protocols. See Section 5, Goal #2, Objective 2.1 for a complete description of potential opportunities.) California has a vested interest in seeing EE products create positive impressions on consumers in the areas of performance and quality, as consumers may project a poor experience with one EE measure onto other EE measures. Technology development support can aid these efforts. As private

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industry is generally best positioned to perform product development, it is important during the screening process to establish the incremental value-added of these ETP activities for these opportunities. Attributes of potential opportunities which would lead to ET / IOU efforts being most necessary, cost-effective, and/or impactful are as follows:

- Issuing rebates or setting rebate program requirements.
- A cost (capital, labor, or expense), the resulting benefit of which would be shared by multiple stakeholders. (Example: making certain expensive pieces of equipment available to test targeted technologies in development by small companies.);
- An investment of funds or resources, said investment being justified from the perspective of the ET mission, but being unattractive when viewed by a single technology developer. (Example: developing a hot-dry AC testing protocol.); and
- Knowledge, equipment, information, or facilities that are very specific to the business of the IOU and may not be easily attainable by private industry without the IOU help. (Example: non-private IOU customer data.)

c. Barriers addressed

Technology development support focuses primarily on product or service unavailability. it also helps overcome organizational practices or customs by guiding a new measure to market that is tailored to specific segment or business needs. Finally, it may address Hidden Costs, a secondary market barrier for ETP, by assisting in development of a measure that minimizes maintenance or installation costs that would otherwise hamper adoption.

d. Expected outcomes

Technology development support will contribute to increased readiness and availability of EE measures for customers and EE program managers and reduced uncertainties for program participants. It also contributes to engagement in product development decision-making by ETP stakeholders and large-scale customer decision makers and decision influencers. This will lead to changes in organizational practices and customs and can lead to reduced maintenance and installation costs that may otherwise limit EE measure procurement and application.

The increased and improved technology supply, due to technology development support, will also lead to further reductions in market barriers, increased intent to purchase/employ measures, and more EE rebates issued. Over time, this will support increasing use of measures by customers, aiding EE programs in achieving energy and demand savings targets, and meeting long term Strategic Plan and policy objectives.

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6. Business Incubation Support

- a. Technology Resource Incubator Outreach (TRIO) is a statewide program that focuses on providing training and networking for entrepreneurs and companies providing energy saving technologies.

- b. Rationale

During a solicitation process review by the PRG, it was mentioned that the utilities need to generate new innovative program ideas “through more outreach and non-traditional methods.” In response to this request, more outreach was conducted via investor forums, university settings, and solicited abstracts that did make the proposal stage in the IDEEA¹ program.

Venture capitalists (VC) were notified of the potential TRIO program and were very interested in technologies that had a utility interest. The VCs were interested in learning how to do business with the utilities, what the utilities expected from entrepreneurs, how to utilize the utility emerging technologies department, and how to go about obtaining a purchase order with an IOU.

From this research the IOUs concluded that more outreach and non-traditional methods to generate new ideas could be generated by providing training workshops and mentoring on participating in IOU programs and the EE business environment. Significant screening activity will be conducted by the IOUs to decide which entrepreneurs and companies will be provided with this training and networking assistance.

TRIO is designed to accelerate the successful development of technologies through an array of engineering support, resources and services, developed and orchestrated by TRIO and offered both through TRIO and its network of contacts. There will be significant coordination with existing clean tech programs (such as the California Clean Tech Open and various clean tech business clusters throughout California).

- c. Barriers addressed

Business incubation support focuses primarily on product or service unavailability. It supports and accelerates market introduction for new measures (increased technology supply), and a particular form of information and search costs for businesses seeking to obtain recognition in IOU incentive and educational programs, as part of their business model. It also helps overcome organizational practices or customs by guiding new measures to market that are tailored to specific segment or business needs.

¹ The IDEEA solicitation process, an SCE third party program strategy, is a comprehensive and multi-faceted approach that draws from the skill, experience, and creativity of the energy efficiency community. The process is designed to help uncover newer methods or program designs for capturing cost effective energy savings and demand reduction for both the short and long-term.

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d. **Expected outcome**

Business incubation support will engender improved understanding of utility programs, as well as technology and business performance and market requirements for small entrepreneurs or large enterprises seeking to develop and/or introduce new EE measures successfully into the market. It will reduce uncertainties for program participants, increase the readiness and availability of EE measures, and increase participation in the IDEEA program as well as in EE incentive and education programs.

Business incubation support will also contribute to increased and improved technology supply over the mid- and long-term, leading to reductions in other market barriers, increased intent to purchase/employ measures, and more EE rebates issued. Over time, it will support increasing use of measures by customers, aiding EE programs in achieving energy and demand savings targets, and meeting long term Strategic Plan and policy objectives.

b) **Advancing Strategic Plan goals and objectives**

The ETP fully supports the goals, strategies and near-term plans of the Strategic Plan. The tables included as Appendix 1 summarize how ETP objectives and action strategies contribute to fulfillment of the Strategic Plan near-term action steps toward the Plan's longer term goals.

One key step that the IOUs are taking to support the goals, strategies and near-term plans of the Strategic Plan is to define ETP Goal 3 as support for the Strategic Plan Big and Bold goals and related solutions, blending market demand and technology supply approaches to move the relevant suites of measures needed to attain the Big and Bold goals and related solutions more quickly. ETP Goal 3 is elaborated in Section 5 below.

Another key step that the IOUs are taking to increase ETP impact in support of the Strategic Plan is strengthening the linkages and feedback loops between ETP and other EE programs, as well as with leading market actors, to help advance development and implementation of new measures that support the Strategic Plan goals and strategies for Research and Technology, the Big, Bold initiatives, and related solutions, such as advanced lighting measures.

These linkages and feedback loops incorporate key EE, IDSM, and other IOU competencies such as EM&V, market research, behavioral, and potential studies, marketing, training, and regulatory support to ensure the deployment of new measures supporting the Strategic Plan will receive the full benefits of the IOUs' enterprise-wide resources.

The ETP organizational linkages and feedback loops will ensure a more cohesive approach to delivery of emerging technology products that in turn will lead to greater

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success in measure introduction, market adoption, and the overarching goal of energy savings. These linkages and feedback loops are further described in Section 6, below.

5. Program Goals, Objectives & Action Strategies

ETP operations will apply the six core program elements described in Section 4 to achieve the ETP goals, objectives, and action strategies.

- ETP Element 1 - Technology Assessments
- ETP Element 2 - Scaled Field Placements
- ETP Element 3 - Demonstration Showcases
- ETP Element 4 - Market and Behavioral Studies
- ETP Element 5 - Technology Development Support
- ETP Element 6 - Business Incubation Support

Each ETP element corresponds to one or more Program Objectives, and each Program Objective supports one of the three ETP goals. In high-level terms, the ETP goals are to increase adoption of measures (market demand), to increase measure supply (technology supply), and to advance Strategic Plan Big, Bold initiatives and related integrated energy solutions. These approaches are complementary and reinforce each other by helping new measures become available in the market and gain stronger market traction sooner than otherwise possible. Collectively, they coordinate with other EE programs and with interventions by non-utility market actors to market transformation efforts aimed at increasing the adoption of EE measures in California, nationwide and internationally.

Actions that increase market demand make developing and launching new measures less expensive, less risky, and generally more attractive to manufacturers and vendors seeking to increase sales and profitability. This increased market demand inherently drives increased technology supply.

Actions that increase technology supply by resulting in more high-quality EE measures in the market encourage existing entrepreneurs and attract new ones to form or join enterprises in the EE market. These actions also attract progressive policy makers, consumers seeking financial and intangible benefits, and investors and others willing to fund innovative measures. This increased technology supply inherently drives increased market demand.

Actions supporting Strategic Plan Big, Bold initiatives and related solutions combine market demand and technology supply approaches. All actors involved in creating technology supply and market demand benefit from interventions by the ETP and complementary efforts.

ETP Goal #1: Contribute to EE/DR market transformation efforts by accelerating stakeholder adoption of measures through transfer of available ETP measures into IOU EE programs or through other implementation channels. The focus of this Goal is increased market demand.

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Objective 1.1

During the 2009–2011 funding cycle, assess 36 EE measures, including integrated demand-side management (IDSMS) measures as defined by the EE Policy Manual².

Action Strategy 1.1.1a: Scan a wide variety of sources for measures that could help IOUs meet customer needs and achieve energy savings, demand reduction, and other IDSMS targets. Following are representative measures for ETP scanning in 2009-2011.

Lighting

Task/ambient lighting designs
LED/SSL lighting applications (internal, external)
Dual relay occupancy sensor
Self commissioning dual loop daylight harvesting
Simplified daylight and occupancy controls
HID electronic ballasts
LED fixtures and systems
Dimmers for CFLs and LEDs
Super CFL
Small HID
Smart occupancy sensor systems
Solid state street lights
Exterior plasma lighting

HVAC

Hot/Dry Air Conditioning (HDAC)
Fault Detection & Diagnostics
Adiabatic cooling
Geothermal heat pumps
Natural gas driven heat pumps
Electric heat pumps

Other

Industrial process technologies
Advanced gas water heating technologies
Super Boiler
Consumer and commercial electronics
Plug loads and associated technologies
Energy Management Systems (all sectors including residential)

² ETP assessments are expected to complete in or before the fourth year after the year in which the assessment is initiated. This window may go well beyond the 2009-2011 funding cycle, especially for ETP assessments initiated in 2011. 2009-2011 funding cycle expenditures will occur throughout the project, meaning that some ETP expenditures could extend through 2015.

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AMI/HAN integrated technologies
Data center technologies (air handling and hardware)

Action Strategy 1.1.1b: Request the results from the 2008 internal DOE assessment of priorities for DOE support of HVAC technologies as part of the scanning efforts. The statewide HVAC Technologies and System Diagnostics Advocacy sub-program outlines a process around HVAC program design, technology assessment, ETP, and codes & standards. The framework includes an HVAC Leadership Task Force, the IOU HVAC Management Steering Technology that includes participation from HVAC program/ETP/Codes & Standards managers, and the Western Cooling Efficiency Center (WCEC).

Action Strategy 1.1.1c: Coordinate with statewide lighting initiatives (including the CLTC, state regulatory organizations, and other key stakeholders) to receive input to the scanning process.

Output for Action Strategy 1.1.1: ET scanning will provide broad technology and market knowledge as a precursor to the ETP screening process.

Action Strategy 1.1.2: Execute a screening process for assessment candidates designed to ensure that the ET team most effectively focuses its time and resources on measures. Utilize the HVAC program and statewide lighting initiatives as resources for providing information utilized in the screening process.

Output for Action Strategy 1.1.2: The ET screening process will produce a list of scored, approved, and funded measures for assessment. Ideas that pass the screening criteria will proceed to the next step of the ET process (Action Strategy 1.1.3)

Action Strategy 1.1.3: Conduct ET assessments to evaluate performance uncertainties and/or other attributes potential effectiveness / impact in reducing energy consumption and peak demand of new and/or under-utilized measures.

Output for Action Strategy 1.1.3: The ETP will produce a report describing results and conclusions from each ETP assessment. Ideas that pass the assessment criteria will proceed to the next step of the ET process (Action Strategy 1.2).

Action Strategy 1.1.4: Develop and maintain a project tracking database containing the variables and attributes to be tracked by all ETCC programs statewide, and data will be reported to the CPUC on a regular basis. The naming convention shown in Appendix 3 will be used by all parties for tracking assessments.

Output for Action Strategy 1.1.4: The ETP will update the CPUC database quarterly.

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Action Strategy 1.1.5: Develop a user guide specifying information required for the ETP screening process for internal and external application to potential candidate measures for ETP assessment.

Output for Action Strategy 1.1.5: The ETP will produce the user guide for the ETP screening process.

Action Strategy 1.1.6: (SCE Only) Maintain testing capability to support technology assessments.

Output for Action Strategy 1.1.6: ETP will fund maintenance of existing TTC facilities and will establish a new ZNE Test Center by 2011. All test facilities will have sufficient technical capability and intellectual capital to assess technologies.

Action Strategy 1.1.7: In addition, ETCC will host input sessions to promote exchange of knowledge, perspectives and ideas two times per year. Like the ET Summit, these sessions will be organized by the ETCC and will be separate from quarterly ETCC business meetings. Increased access to ideas from outside organizations and entities will help the ETP maximize innovation and energy savings.

Output for Action Strategy 1.1.7: Minutes capturing assessment suggestions will be recorded for each session and used as an input to the scanning process.

Objective 1.2

During the 2009–2011 funding cycle, transfer 15 measures from the ETP into the EE programs, with the goal of producing energy savings and/or demand reduction. Transfers may include measures from assessments initiated or completed in previous ETP cycles, as well as those from the current 2009-2011 program cycle.

Action Strategy 1.2.1: Evaluate program activity to assess the market acceptance two years, and potentially three years, after the launch of a measure transferred from ET. Review these findings with EE Program staff regarding potential improvement to both ET and EE program activities.

Output for Action Strategy 1.2.1: The ETP will track EE program activity for measures assessed in the ET program.

Action Strategy 1.2.2: The ETP will provide information to internal stakeholders from assessments that could help IOU's IDSM resource acquisition programs create new measures, or revise/integrate existing measures, that increase energy savings in a variety of market sectors. Specific activities will include ensuring final reports are distributed and made available, discussing results with EE program managers and IDSM clients, and assisting with communications and program documentation, as needed.

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Output for Action Strategy 1.2.2: Internal stakeholders will receive ETP final reports, discussion of ETP results, and other communication and documentation when relevant.

Action Strategy 1.2.3: Communicate information on high-potential ET assessment findings to external stakeholders. Consult with internal and external partners to determine appropriate outreach activities for select specific measures. Possible outreach activities include:

- Post reports and results on the ETCC website;
- Debrief assessments partners on findings through a meeting, memo, or podcast;
- Execute public relations efforts, such as development and dissemination of press releases and articles for trade publications;
- Present findings at industry and community meetings/conferences, with a focus on promoting IDSM efforts;
- Submit articles to industry publications;
- Provide technical information to, and support information dissemination by the energy centers operated by each of the IOUs;
- Meet with market actors, including technology owners, manufacturers, allies, channel partners, trade association members, utilities, investors, and technology developers; and
- Utilize the bi-annual ET Summit Conference as a forum to communicate assessment results.

Output for Action Strategy 1.2.3: The ETP will post reports and results on the ETCC web site (<http://www.etcc-ca.com>) when the results/findings are appropriate for external dissemination. Due to high tracking costs, some line item outreach activities in Action Strategy 1.2.3 are not mentioned here.

Action Strategy 1.2.4: Proactively serve as subject matter experts and advisors to EE and IDSM program managers. Support transfer and development of EE measures based on assessments and market and behavioral studies. Coordinate with EE programs and other IOU resources needed for successful EE measure roll-out.

Output for Action Strategy 1.2.4: Increased EE program manager knowledge and understanding.

Objective 1.3

Conduct at least six scaled field placements during the program period to increase market understanding³ and traction for new and under-utilized measures⁴.

³ It should be noted that unlike assessments, the primary information dissemination mechanism for scaled field placements is first hand experience utilizing the measure.

⁴ ETP scaled field placements are expected to complete in or before the fourth year after the year in which the scaled field placement is initiated. Therefore, expenditures for scaled placements initiated and funded for the 2009-2011 program cycle may be incurred through 2015.

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Action Strategy 1.3.1: Scan a wide variety of sources for measures for scaled field placements that could help IOUs to increase market understanding and traction for new and under-utilized measures.

Output for Action Strategy 1.3.1: ET scanning will provide broad technology and market knowledge as a precursor to the ETP screening process to identify opportunities for scaled field placements.

Action Strategy 1.3.2: Execute a screening process for scaled field placements candidates designed to ensure that the ET team focuses its time and resources on measures most effectively.

Output for Action Strategy 1.3.2: The ET screening process will produce a list of scored, approved, and funded measures for scaled field placements. Ideas that pass the screening criteria will proceed to the next step of the ET process (Action Strategy 1.3.3)

Action Strategy 1.3.3: Conduct scaled field placements to increase market acceptance and traction for new and under-utilized measures⁵.

Output for Action Strategy 1.3.3: At a minimum, the following data will be tracked for each scaled field placement: documents supporting the funding decision, number of measures installed, and EE program activity for programs where the installed measures would qualify.

Action Strategy 1.3.4: Evaluate program activity to assess the market acceptance at one year and two years, and potentially at three years after the launch of a scaled field placement. Review these findings with EE Program staff regarding potential improvement to both ET and EE program activities.

Output for Action Strategy 1.3.4: The ETP will track EE program activity for EE measures utilized in scaled field placements.

Objective 1.4

Develop six IOU demonstration showcases to expose stakeholders to the performance of measures. Highlight real-world applications and installations for market actors and end users^{6,7}.

⁵ Note: Measures in scaled field placements will almost exclusively be measures already included in EE programs.

⁶ It should be noted that unlike assessments, the primary information dissemination mechanism for demonstration showcases is first hand exposure to the measure.

⁷ ETP Demonstration Showcases are expected to complete in or before the fourth year after the year in which the Demonstration Showcase is initiated. Therefore, expenditures for demonstration showcases initiated and funded for the 2009-2011 program cycle may be incurred through 2015.

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Action Strategy 1.4.1: Scan a wide variety of sources for measures for demonstration showcases that could expose technology to various stakeholders and demonstrate technology performance and applicability in real world applications.

Output for Action Strategy 1.4.1: ET scanning will provide broad technology and market knowledge as a precursor to the ETP screening process to identify opportunities for demonstration showcases.

Action Strategy 1.4.2: Execute a screening process for demonstration showcases candidates designed to ensure that the ET team most effectively focuses its time and resources on measures.

Output for Action Strategy 1.4.2: The ET screening process will produce a list of scored, approved, and funded measures for demonstration showcases. Ideas that pass the screening criteria will proceed to the next step of the ET process (Action Strategy 1.4.3)

Action Strategy 1.4.3: Conduct demonstration showcases to expose technology to various stakeholders and to demonstrate technology performance and applicability in real world applications.

Output for Action Strategy 1.4.3: At a minimum, the following data will be tracked for each demonstration showcase: documents supporting the funding decision, location of installed measures, and any available data regarding people who viewed/attended/participated.

Objective 1.5

Market and Behavioral Studies: Perform targeted studies of customer behavior, decision making, and market behavior to gain understanding of customer/market perception and acceptance, and to identify potential barriers to measure adoption.

Action Strategy 1.5.1: Perform primary IDSM related market and behavioral studies to enhance market intelligence of customer needs and “decision triggers” to improve acceptance of new or under-utilized energy efficiency technology.

Output for Action Strategy 1.5.1: All market and behavioral studies will be captured in a final report.

Action Strategy 1.5.2: Review and analyze secondary research as found, for example, from IOU subscription market research services such as E Source and Energy Insights, and from such organizations as Energy Information Administration, National Technical Information Services, and CALMAC, as well as in reports such as the Residential Appliance Saturation Survey and Commercial End-Use Survey.

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Output for Action Strategy 1.5.2: Secondary research findings will be captured in a final report.

Action Strategy 1.5.3: Complete one or more of the following types of studies:

- Perform market research studies to assess the potential impact of and barriers to implementation of proposed measures;
- Investigate specific technology gaps for a given market segment;
- Conduct an Energy Technologies/RD&D gap analysis for agricultural EE as included in the Strategic Plan; Identify and prioritize needed RD&D/ET projects;
- Perform customer research to assess the need for and optimal design of scaled field placements and demonstration showcases;
- Perform usability studies to assess how easily customers can adapt to and benefit from new measures; For instance, in-home monitoring and display technologies;
- Perform a scoping study of the overall long-term market potential for Emerging Technologies
- Perform customer research to identify approaches to making new measures more attractive to customers;
- Perform customer research on the potential impact of social network software and other behavioral tools in expanding the impact of EE programs; and
- Perform market research to identify approaches for accelerating the pace of deployment of new EE and IDSM measures and programs.

Output for Action Strategy 1.5.3: Produce reports summarizing study findings.

Action Strategy 1.5.4: Disseminate market and behavioral reports.

Output for Action Strategy 1.5.4: Post all market and behavioral reports on ETCC web site, where results/findings are appropriate for dissemination.

ETP Goal #2: Contribute to EE/DR market transformation efforts by assisting technology developers and manufacturers to create technology supply with respect to emerging technologies, including supply for the Big Bold Initiatives described in ETP goal 3 below, thereby increasing the number of EE measures that are available for adoption. The focus of this Goal is increased technology supply.

Objective 2.1

Technology Development Support – During the 2009-2011 program cycle, the ETP will screen, select, and implement three targeted technology development support projects to benefit EE product development.

Action Strategy 2.1.1: Identify targeted opportunities to develop forward looking product specifications which could be used by a multitude of product developers. This

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effort could be most effective if the opportunity exists to tie future rebates or other incentives to the specifications. This may include development of an open source or proprietary product specification for entrepreneurs to build to – possibly with incentives. This may also contribute to competitions to develop new product concepts/meet specifications.

Output for Action Strategy 2.1.1: Produce open source or proprietary specifications.

Action Strategy 2.1.2: Look for targeted opportunities to establish product baseline performance levels. As an independent entity, the utilities may be in a position to establish baseline performance levels. This baseline information would serve as an input to product development efforts. Often, it is expensive and time consuming for developers to establish baseline performance in a product segment.

Output for Action Strategy 2.1.2: Distribute baseline performance level reports to targeted product developers and partner entities.

Action Strategy 2.1.3: Look for targeted opportunities to develop standard test protocols for energy efficient products, in support of statewide Codes & Standards Program.

Output for Action Strategy 2.1.3: Develop and disseminate standard EE product test protocols in conjunction with statewide Codes & Standards Program.

Action strategy 2.1.4: Look for targeted opportunities to provide customer contacts for testing and focus groups. Utilities may be in a unique position to help connect product developers with customers willing to participate in field tests of measures and provide feedback.

Output for Action Strategy 2.1.4: A list of customers who have agreed to have their contact information shared with a technology developer.

Action strategy 2.1.5: Look for targeted opportunities to conduct market or behavioral studies and otherwise provide and/or collect market intelligence. Utilities may have access to or the ability to collect market intelligence that would help justify product development investment and guide product development targets.

Output for Action Strategy 2.1.5: Any market or behavioral studies will be captured in a final report.

Action strategy 2.1.6: Look for targeted opportunities to make expertise/knowledgeable personnel available as resources to product developers. Utilities may be in a position to advise on certain subject matter.

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Output for Action Strategy 2.1.6: Produce an activity report for time charges incurred by ETP, while providing support to product developers.

Action Strategy 2.1.7: Look for targeted opportunities to make testing facilities and/or other infrastructure available to multiple product developers. Utilities may be in a position to facilitate the sharing of capital intensive testing facilities or other infrastructure across parties developing energy-efficient products. Often, these resources serve as a barrier to product development or as a barrier to product quality and performance success.

Output for Action Strategy 2.1.7: Produce an activity report for testing and other infrastructure support provided to product developers

Objective 2.2

Incubate businesses developing or selling EE measures. TRIO focuses on providing training and networking for entrepreneurs and companies providing energy saving technologies. This will include providing training workshops and mentoring on participating in IOU programs and the EE business environment. There is significant screening activity to decide which entrepreneurs and companies will be provided with this training and networking assistance.

As a sub-program component, more detailed information regarding the TRIO efforts are included in Section 8 of this PIP.

ETP Goal 3: Support achievement of the Strategic Plan Big, Bold initiatives for ZNE New Residential Construction, ZNE New Commercial Construction, ZNE for Existing Buildings, HVAC Industry and Market Transformation, and related solutions, such as advanced lighting measures, through programs and initiatives aimed at each. As the Strategic Plan is prominent in the activities of the ETP, a significant portion of the efforts undertaken towards goals 1 and 2 will contribute towards goal 3.

Objective 3.1

Help advance at least 12 innovative measures and/or strategies to support ZNE New Residential Construction, ZNE New Commercial Construction, ZNE for Existing Buildings, HVAC Industry and Market Transformation, and related solutions during 2009–2011.

Action Strategy 3.1.1: Scan, screen and execute emerging technology projects in the areas of assessments, scaled field placements, demonstration showcases, market and behavioral studies, and/or technology development support to support ZNE New Residential Construction, ZNE New Commercial Construction, ZNE for Existing Buildings, HVAC Industry and Market Transformation, and related solutions during 2009-2011. (Projects in this action strategy will be considered to fulfill objectives in multiple Goals where relevant.)

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Output for Action Strategy 3.1.1: Outputs for these projects would be as stated for the corresponding projects under goals 1 and 2.

Objective 3.2 (SCE Only)

TTC is an SCE-only program that provides state-of-the-art testing facilities for conducting ETP projects and evaluating new technologies in support of the Strategic Plan's Big, Bold initiatives.

The TTC will maintain testing capabilities to specifically address Big, Bold residential ZNE and HVAC initiatives. Lessons learned from residential ZNE may also be used to support the Big, Bold commercial ZNE initiative. Additional important end uses, including lighting and refrigeration, will be the focus of distinct TTC test facilities. As a sub-program component, more detailed information regarding the TTC efforts are included in Section 8 of this PIP.

Objective 3.3 (PG&E only): Create the PG&E ZNE Laboratory resource for providing independent verification of the performance and energy savings of technologies with potential to help meet ZNE goals and support design of ZNE codes and standards.

Objective 3.4 (PG&E only): Develop the PG&E ZNE Demonstration Home to create a resource for testing the performance of integrated ZNE measures, providing hands-on training, and fueling the imagination of market actors and end users. (See Section 8)

Section 5 Numerical Deliverables

The 2009-2011 ETP brings an expanded set of tools to the complex task of supporting Strategic Plan's goals, while assisting EE and IDSM programs in achieving maximum impact. As certain objectives involve activities that are new to the ETP, there is some degree of inherent uncertainty with regards to numerical deliverable levels. (An example of a numerical deliverable is "Conduct XX scaled field placements.")

To account for this inherent uncertainty, while allowing the use of numerical deliverables, the ETP may need to substitute additional assessments in place of other program deliverables, if necessary, in order to meet numerical deliverable levels described in this PIP. For instance, if projections for a demonstration showcase for an "Office of the Future" are significantly more costly than anticipated, the ETP may substitute one or more technology assessments to assure a successful, timely, and cost-effective outcome from all objectives that contribute to the ETP Goals.

6. Coordination and Integration

a) IOU coordination efforts are described below

i. ETP Statewide Coordination

A key strength of the ETP is the value created through ongoing collaboration among the statewide IOUs. Continuing and enhancing this statewide collaboration will contribute to the successful accomplishment of the ETP goals and objectives.

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6.1.1 – Leveraging role of the Emerging Technologies Coordinating Council (ETCC): The ETCC plays a central role in statewide ETP coordination. The ETCC membership consists of the IOUs, the CEC, and CPUC staff. During 2009-2011, the ETCC will meet at least four times per year to coordinate activities, exchange information, and define new and enhanced collaboration strategies.

Discussion at ETCC business meetings may touch on privileged customer information, business strategic and operational details, and privileged manufacturer product details that are too sensitive to discuss in an open forum. For this reason, ETCC business meetings will not be open to the general public.

The ETCC also convenes sub-groups to address statewide ETP collaboration opportunities that require additional time beyond what is available during regular ETCC meetings. For instance, a standing lighting sub-group meets quarterly, and the ETCC will host an upcoming hot, dry air conditioner meeting with the Western Cooling Efficiency Center at UC Davis.

6.1.2 – Collaboration with Municipal Utilities: As over 300 California municipal utilities launch or expand EE efforts, they are becoming increasingly aware of the need for, and potential benefits of, new and under-utilized measures to meet EE program goals. The ETCC is responding by promoting coordination and information sharing between ETCC members and municipal utilities.

This collaboration will include sharing information and results connected with upcoming IOU and CEC market studies, measure assessments, and scaled field placement activities. The IOUs will also provide recommendations to municipal utilities that have their own ET programs or are considering launching ET efforts, and may encourage municipal utility ET program staff to attend quarterly ETCC meetings.

Due to the large number of municipalities, their geographical range and varying stages in EE program development, the ETCC will work with convenors such as the largest and most advanced municipalities (SMUD, LADWP, City of Palo Alto, etc.) and municipality-coordinating entities like the Northern California Power Agency and Southern California Public Power Authority.

6.1.3 – Forums and Training: The ETCC will support the Incubation objective under ETP Goal 2 by holding quarterly training sessions for researchers to educate them about utility and investor perspectives, challenges, and needs.

6.1.4 – Knowledge Sharing: On a strategic level, the statewide ETP is committed to developing and implementing practices and tools to maximize collaboration and integration among the IOU ETPs. This will include comparing ETP local plans and identifying opportunities to reinforce and maximize statewide coordination and

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integration, keeping in mind the distinct resources, expertise, and customer base for each IOU.

6.1.5 – Coordination with non-IOU entities: Finally, the statewide ETP will expand statewide emerging technology projects and projects that leverage funding from non-IOU entities. The IOU ETPs will continue to identify and participate in collaborative projects that are co-funded by federal agencies or other large funders and that meet ETP criteria.

ii. ETP Coordination with EE Resource & Non-Resource Programs

The ETP maintains crucial touch points with EE resource programs and many non-resource programs, which serve as key clients for the measures that ETP assesses and makes available for implementation. Coordination with these EE programs occurs throughout the ETP screening, selection, assessment, and transfer process.

6.2.1 – Idea Generation Coordination: Ideas for new measures often come from EE program staff or through the professional networks of EE staff. At the screening stage, the ETP relies on input from EE program managers to score measures for assessment. EE program staff also play a key role in identification of host sites for field assessment projection, scaled field placements, and demonstration showcases. The transfer of new measures from the ETP into EE programs takes place through a close collaboration between the programs.

6.2.2 – Feedback Loop with IOUs and M&V Community: In 2009-2011, the ETP will expand feedback loops with program staff and M&V consultants to increase the understanding by ETP and EE program staff of impacts from each new measure that has been transferred to EE programs, including those that do not achieve projected levels of market penetration, energy savings, or demand reduction.

This will take the form of an initial meeting 12 months after a measure is transferred from ETP to an EE program, with a second meeting 24 months after transfer. An additional follow-up meeting will be scheduled three years after transfer, as needed.

iii. ETP Coordination with Cross-cutting Programs (Codes & Standards, Statewide M&O, WE&T etc.)

The ETP has a history of productive connections with cross-cutting programs including Codes & Standards and Energy Centers, and has successfully demonstrated that collaboration can maximize the impact achieved by all parties. In addition, SCE's TTC serves as a resource to ETP project managers, providing a unique venue to perform in-house testing of technologies to support ETP goals.

6.3.1 – Assessment Synchronization: In 2009-2011, ETP staff will hold regular conversations with Codes & Standards staff to exchange methods for estimating the impacts of new measures through analysis and testing. Where practical, the ETP will collaborate with Codes & Standards on measure assessments, and will seek to identify and transfer measures with potential to go directly from ETP to Codes & Standards.

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6.3.2 – Collaboration with Energy Centers: ETP will continue to grow its multi-faceted collaboration with Energy Centers, where new measures for potential assessment may be suggested by visitors or staff, where some assessments may be conducted in a controlled field environment, and where successful assessments are often showcased in exhibits that educate hundreds to thousands of interested customers.

6.3.3 – Cross-cutting Programs Coordination: The statewide Workforce Education & Training (WE&T) and statewide Marketing, Education & Outreach (ME&O) programs will offer new coordination opportunities. ETP assessments and market and behavioral research may pinpoint marketing and education needs that these two cross-cutting program can deliver. Conversely, these programs can identify opportunities for new or under-utilized measures, and may find potential limitations in EE measures that lend themselves to action by ETP. For instance, a new type of fan that is featured in a WET program could elicit comments by contractors about installation or maintenance issues that the ETP can address or can relay to the product developer or manufacturer.

6.3.4 – Feedback Loop with Cross-cutting Programs: As with statewide and local IOU EE Resource and Non-Resource programs, the ETP will expand feedback loops with cross-cutting programs to increase the understanding by ETP and EE program staff of impacts from selected new measure that are relevant to the audiences, staff, and information gathering capabilities of the cross-cutting programs.

iv. ETP Coordination with IDSM

ETP has long-standing and strong connections with energy efficiency and demand response (DR) programs, and is poised for broader IDSM integration. In 2009-2011, ETP will undertake a coordinated effort to support innovation in EE, DR, renewable and combined heat and power programs. Among the many examples of this, ZNE new commercial construction, ZNE new residential construction, and ZNE for existing buildings stand out as opportunities to integrate on-site or neighborhood generation, co-generation, EE, and DR opportunities. Under the ETP demonstration showcases Objective 1.4 and Goal 3 described in Section 5 above, residential and commercial sites will be developed featuring integrated energy systems for proof-of-concept, technology and usability assessment, and market exposure.

ETP brings a strong aptitude for IDSM integration, since assessment results for lighting and HVAC control strategies are equally applicable to EE and DR programs. It is natural to expand an EPT assessment to investigate both options with relatively modest incremental efforts, compared to an assessment for just EE or DR. Several control strategies listed under Action Strategy 1.1.1 in Section 5, above, can potentially be part of such an IDSM assessment.

Similarly, ETP has experience with EE – DR – on-site generation / cogeneration applications. For instance, ETP led efforts in 2007-2008 to obtain a CPUC waiver of EE Policy Manual requirements that might have disallowed incentive payments for the

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SolarBee water treatment technology, which uses integral onsite solar electric generation to operate.

Going forward, the EE Policy Manual should be revised to reflect a bias towards IDSM and to disambiguate issues like the one that raised questions about the SolarBee technology.

Finally, ETP IDSM coordination will benefit from the existing ETP network of partners described in Section 6.v., below, and elsewhere in Section 6. The statewide IDSM PIP provides additional information on these issues.

The IOUs will coordinate program efforts with the local utility integration teams and the Statewide Integration Task Force to identify successful integration approaches and offerings, potential pilot programs and metrics.

v. ETP Coordination with External Organizations and Entities

Collaboration with external partners and allies plays an essential role in virtually all aspects of ETP operations, from screening and selecting measures for assessment, to performing assessments and scaled field placements, developing demonstration showcases, communicating ETP results, and transferring measures to the market through EE programs and other implementation channels.

6.5.1 – Alliances External Organization: To ensure successful coordination with the full range of external organizations and entities involved in developing new measures, ETP staff will receive explicit assignments and budgets for outreach and conference attendance to maintain a high level of awareness of research and development (R&D) activities across government, utilities, agricultural extension and university programs, and private industry, including selected proprietary efforts.

This interaction provides both ideas for new ETP measures and access by the ETP to propose new concepts or modifications to existing research that will result in measures for future ETP assessment and EE deployment. In this way, ETP uses its alliances with external R&D entities to leverage private industry and federally funded technology research and investment for the benefit of California ratepayers.

For instance, CEC PIER and The Watt Stopper, Inc. have provided valuable new measures to the ETP and have also been receptive partners, incorporating ideas from the ETP for their new measure R&D.

6.5.2 – Codes and Standards Integration: When ETP has completed review of a measure, external organizations play a crucial role in disseminating the results before, during, and after the transfer of the measure to EE programs or other implementation channels. For instance, ETP collaborates with industry trade organizations, large tech companies, entrepreneurs, UC Berkeley Center for the Build Environment, consultants, and others on educational outreach for building envelope EE measures.

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Another example is ETP work on HVAC measures that may go directly to building standards. In these cases, ETP supports the Statewide Codes & Standards program through at all stages of measure development and evaluation through alliances with the California Building Standards Commission, American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) technical committee members to accelerate building design standards.

On lighting measures, ETP works with the DOE, Environmental Protection Agency (EPA), Illuminating Engineering Society of North America (IESNA), CEC, including the CEC PIER program, and leading lighting manufacturers and consultants.

Finally, the ETP partners with TRIO, a new statewide program described in Section 8, below, that helps bridge the gap between entrepreneurs, utilities, and the investment community.

7. Marketing and Outreach/Education & Training

To maximize the benefits of its work, the ETP delivers information in many forms to many different groups. (The primary means for the ETP to disseminate information is through EE programs, including the Energy Centers.)

Among these benefits, ETP communications on measures that are being transferred or have been transferred to EE programs will assist companies, departments, and governmental entities in understanding EE measures' actual performance, breaking down barriers to proactive implementation.

7.1 – Sharing of Information through ETCC: The ETP partners will continue to utilize the ETCC as a central medium for the delivery of ET information. The ETCC website (www.etcc-ca.com) provides an overview of the ET program, a database of ETP project reports and fact sheets, information on upcoming meetings, and information on hosting an emerging technology project or proposing a measure for consideration.

7.2 – Distribution of Information through Other Sources: The ETCC website is just one of ways the ET program transfers information. Findings, results, and analyses are delivered to a variety of audiences through one or more of the following mechanisms:

- Providing technical information to Energy Centers run by each of the IOUs, supporting Energy Center information dissemination;
- Providing technical information to utility energy efficiency programs, supporting energy efficiency program information dissemination;
- Speaking opportunities with community organizations;
- Presenting open houses at ETP demonstration showcase sites for key stakeholders and the public at large;
- Meetings and coordination with technology owners, manufacturers, allies, channel partners, trade association members, utilities, investors, and technology developers;
- Presentations at state, local, and national meetings and conferences;

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- Analysis and design tools intended for utility energy efficiency program and product developers, technology owners and manufacturers, and others;
- Public relations efforts, such as development and dissemination of press releases, media kits, and articles for trade publications; and
- Organizing and producing the bi-annual Emerging Technology Summit Conference, a collaborative effort among the IOUs with the CEC PIER Program.

8. Sub-Program Components

Components of Emerging Technologies that have specific functions, budgets and targets and that employ unique delivery mechanisms are listed as sub categories below.

a) Technology Resource Incubator Outreach (TRIO) Program

TRIO is a statewide program that aims to draw a greater number of providers of desired, energy saving measures into the utility EE programs (and the IDEEA program, for Southern California Edison) by:

- Providing training workshops;
- Providing energy efficiency “mentoring”; and
- Coordinating with existing clean tech programs (such as the California Clean Tech Open and various clean tech business clusters).

TRIO Goal 1: Contribute to the market transformation with efforts that accelerate the commercialization of energy-efficient measures.

TRIO Objective 1.1

Reach out to five universities, PIER, three investors, and other research organizations to solicit innovative EE concepts, then screen those measures and bring them in as potential program participants.

Action Strategy 1.1.1: Select a sufficient number of promising measures within these organizations that meet the screening criteria for a utility EE program. This utility interest in a specific energy efficient measure will leverage investor participation.

Output for Action Strategy 1.1.1: The statewide team, with a representative from each IOU, will visit a range of different organizations per year. A hand-off document will be generated for PIER-specific technologies that have an energy-efficient and demand-response component.

Action Strategy 1.1.2: Score the selected measures with criteria that meet current EE requirements. An early score-based review of each measure will allow for incubation of measures that will meet program requirements in the future.

Output for Action Strategy 1.1.2: Due diligence questionnaire must be completed and reviewed by ET staff. After a pass/fail review by the Emerging Technology engineer, the contact (entrepreneur, engineer, university student, or investor) of that due diligence questionnaire will attend the workshops listed in Goal 2.1

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Action Strategy 1.1.3: Reach-out to investor deal flows to find potential energy efficient measures. Create a screening process for investors so they are aware of utility requirements for an energy efficient measure. Find out what technologies the market is demanding.

Output for Action Strategy 1.1.3: Participate and hold round table meetings with investors.

TRIO Goal 2: Provide transparency of each IOU's demand side management rebate and incentive processes.

TRIO Objective 2.1

Provide one workshop per quarter, rotating between IOUs, on "how to" do business with utilities.

Action Strategy 2.1.1: These workshops are geared toward third party implementers and the requirements necessary to be awarded a purchase order by a utility. These workshops will educate the investor and technology communities on the requirements necessary for doing business with utilities.

These workshops will include the requirements of measure selection, DSM integration, technical documentation (for example, E-3 calculator, DEER etc.), energy efficient and demand response definitions, and the California Solar Initiative. Investors, entrepreneurs, and manufacturers will become educated about what a utility qualifies as an EE and demand response measure. This qualification will make the measure more viable for investment purposes.

Output for Action Strategy 2.1.1: Hold quarterly education workshops, rotating between each IOU.

TRIO Objective 2.2

Review 100 percent of the abstracts submitted to the IDEEA program (SCE only) that are promising, but not developed to the appropriate stage for that program. In 2009-2011 the IDEEA solicitation will remain competitive and will now be offered year round.

This approach is consistent with the CPUC direction to conduct a competitive bid "for the purpose of soliciting innovative ideas and proposals for improved portfolio performance".⁸ The competitive bid will target and promote the latest energy efficiency technologies throughout the 2009-2011 program years.

⁸ D. 05-01-055, Section 5.2.1, p. 94

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The technologies reviewed by the TRIO program will range from prototype to production. By reviewing technologies and educating entrepreneurs more measures can be adopted in all IOU programs.

Action Strategy 2.2.1: Participate in the IDEEA program solicitation process in order to assess the abstract evaluated as high potential for energy efficiency.

Output for Action Strategy 2.2.1: Receive 100% of rejected abstracts screened and accepted

Action Strategy 2.2.2: Review SCE's ETP and portfolio to find potential candidates.

Output for Action Strategy 2.2.2: Review of ETP and TTC portfolios to screen potential TRIO candidates.

b) TRIO Coordination & Integration

Statewide IOU coordination will include monthly meetings to discuss the workshops and roundtable. Each utility will designate a TRIO contact person to coordinate the workshops. Each workshop is held at a different utility to support statewide participation. Each utility will manage their specific budgets. The criteria used to evaluate measures will be developed through a statewide ETP effort:

- i.** TRIO statewide coordination - There will be monthly meetings attended by all California IOUs to discuss workshops and roundtable with investors.
- ii.** TRIO coordination with statewide and local EE programs - Meetings will be conducted and include program managers from statewide and local programs to assist in reviewing innovative measures.
- iii.** TRIO coordination with cross-cutting - Workshops and roundtables will state the need for cross-cutting programs. Any cross-cutting measure that comes to the TRIO program will be evaluated by cross-cutting program managers.
- iv.** TRIO coordination with IDSM - There will be DSM coordination during the workshops, educating the candidates about demand response, California Solar Initiative, and energy efficiency. Training materials will be created that include an explanation of how to incorporate IDSM. The roundtables discussions will also include these materials.
- v.** TRIO Coordination with External Organizations and Entities - TRIO will invite PIER, CalCEF, Clean Tech Open, CalStart, and various universities to education workshops on how to do business with utilities. Workshops will be sponsored by each utility per quarter.

Example: SCE will have a workshop in September 2009, PG&E will have a workshop in October, and SEMPR will have a workshop in November. Venture

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capitalists and angel investors will be invited to quarterly roundtable meetings. In these roundtables, PIER will also be invited to discuss measures in their portfolio. There will be yearly measure showcases of the top three TRIO candidates. The audience will include Clean Tech Open representatives, university staff, investors and other opinion leaders.

TRIO Marketing & Outreach/Education & Training

- TRIO will provide monthly workshops for all stakeholders and quarterly roundtables with investors and government programs to provide education. TRIO will outreach by attending and judging innovative competitions at universities and Clean Tech Open. TRIO will also market the program in Entrepreneur Magazine, Fast Company, and various innovative forums.
- A statewide website will be developed for the TRIO program. This website will provide workshop and roundtable schedules for each utility. The TRIO website will also link to the ETCC website.

c) PG&E ZNE Laboratory

Aware of the need for new technologies to meet California's ZNE goals for homes and commercial buildings, vendors are presenting a range of products designed to provide specific energy savings benefits. However, before incorporating such products into customer offerings, independent verification of performance and energy savings claims under a controlled laboratory setting are needed to avoid expending time, money, and resources on offerings that do not provide the expected energy savings and other customer benefits and put customer satisfaction at risk.

Today, utilities lack a dedicated laboratory for examining the critical and often inter-related technologies and technology features that may make ZNE homes possible. Therefore, potential ZNE technologies will be verified through third parties—a scenario that raises several issues. At a minimum, contracting with third parties presents a significant administrative and time burden, slowing the availability of results. Second and more important, no single lab is equipped to specifically examine ZNE potential. As a result, findings could fail to shed light on technology shortcomings and recommendations for design improvements might be based on a limited understanding of the technology's full potential. Moreover, the labs are unable to identify and explore opportunities to achieve stronger performance through technology integration.

To accelerate and integrate ZNE technology evaluation and create more robust findings and design recommendations, PG&E proposes to expand its Applied Technology Services capabilities to include a laboratory dedicated to testing ZNE products and technologies.

ZNE Lab Goal 1: Provide a cost- and time-effective means to identify technologies that may enable ZNE homes, commercial buildings, and communities.

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ZNE Lab Objective 1.1

By mid-2010, make operational a ZNE lab for testing ZNE measures and the integration of ZNE measures.

Action Strategy 1.1.1: Expand PG&E's Applied Technology Services capabilities to include a laboratory dedicated to testing ZNE measures. Ensure that the lab includes these and other features that will help it achieve its mission:

- An office area, a conference room, and 3,000 square feet of open workspace;
- A range of laboratory-grade evaluation equipment to allow testing and verification of ZNE measures needed to help homes and commercial buildings approach and achieve the ZNE targets;
- Specialized work areas to facilitate testing of integrated sets of products to illuminate the benefits possible through technology integration; and
- Design flexibility—the ability to install solar collectors, envelope systems, fenestration, and green roofs—to enable PG&E to test and compare systems and provide climate responsive design to architects and engineers.

Output for Action Strategy 1.1.1: An operational laboratory that will enable independent verification of ZNE technologies, helping IOUs and other partners focus on technologies with the greatest potential, thereby accelerating the development of ZNE buildings and reducing technology risks.

d) ZNE Demonstration Home (PG&E)

Achieving California's ambitious ZNE goal for new homes will require a host of innovations and a shift beyond the single technology approach into whole-home solutions. To accomplish this, new technologies, a clear understanding of the evolving performance of integrated technologies, and real-world experience with technologies will be critical for future program successes.

Also needed are resources for education and training homeowners, builders, manufacturers, contractors and others about ZNE homes. These resources need to be sufficiently concrete to raise confidence in the collective ability to achieve the ZNE goal—and sufficiently stimulating to spark innovation in the market and market actors. Today, no such resource exists.

To address this need, the PG&E ETP, in collaboration with the SmartMeter, ZNE Pilot Program, and Demand Response teams, are proposing the ZNE Demonstration Home as a one-stop solution for the testing and demonstration of integrated ZNE measures, providing hands-on technical training, and fueling the imagination of market actors and end-users alike. A modular design enables researchers to evaluate multiple versions of the same measure in a home-like setting.

ZNE Demo Home Goal 1: Provide a one-stop solution to test and demonstrate integrated ZNE measures, train technical partners and educate the community.

Emerging Technologies

ZNE Demo Home Objective 1.1

By 2011, make operational a ZNE Demonstration Home for promoting the integration of ZNE measures.

Action Strategy 1.1.1: Build a ZNE Demonstration Home equipped to allow integrated technology evaluation, training, and educational visits. Ensure that the Demonstration Home includes these unique features to enable these functions:

- **A modular design** to allow researchers to evaluate multiple versions of the same technology in a home-like setting;
- **Instrumentation** to create better understanding of how integrated sets of measures—such as energy efficiency equipment, integrated demand side management (IDSM) tools, renewable generation, and demand response (DR) strategies—perform together and lead to design recommendations to further improve technology;
- **A home area network (HAN)-enabled SMART Meter** to demonstrate the role of communications and control in achieving the ZNE goal;
- **Special events and public access** to the ZNE Home at designated times will showcase the ZNE concept and tools to key audiences, inspiring them to contribute to the market supply and demand needed to make ZNE goals a reality; and
- **A training and education center** next to the Demonstration Home —featuring displays linked to the instrumentation in the home and hands-on technical courses—to familiarize end users and market actors with ZNE products.

Output for Action Strategy: An operational ZNE Demonstration Home that furthers understanding of, and interest in, ZNE homes by providing IOUs a better understanding of the integration and performance of potential ZNE technologies, and enabling technical training and public outreach and education.

e) SCE Technology Test Centers

SCE's TTCs provide unique capabilities for evaluating performance of new technologies. Located in Irwindale, the TTC is currently comprised of three test facilities focused on distinct end uses: Refrigeration, Air Conditioning, and Lighting. These facilities are widely known for their past accomplishments in testing and promoting energy efficient technologies and strategies.

In the 2009-2011 program cycle, a fourth test facility will be added to the portfolio to help meet California's new ZNE goal for residential construction, with potential to also address commercial needs. This facility, the ZNE Test Center, will be used to investigate the viability of energy efficiency, demand response, smart meters, and on-site renewable generation in ways that meet the needs of builders and occupants. It will be designed as a flexible facility to accommodate a range of different envelope, space conditioning, lighting, plug-load, and renewable technologies. The ZNE Test Center will provide the opportunity to examine these technologies on a system level, while individual benefits can be assessed in the existing TTCs.

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All four test facilities will provide critical services to a wide range of SCE's EE programs. The main function is to provide impartial laboratory testing and analysis of technologies, especially as a resource for Emerging Technology project managers. These activities will be used to expand the portfolio of EE measure offerings, quantify energy savings for EE measures, alleviate concerns about performance uncertainties, and verify the feasibility and validity of proposed codes and standards enhancements. A laboratory setting allows for the performance of detailed and replicable tests which are realistic, impartial, and uninfluenced by variables. Tests may be conducted according to industry standard test procedures or based on particular environmental conditions experienced by SCE customers.

TTC staff will also serve a secondary function as a repository of technical information and expertise. The unique knowledge obtained from actually installing and working with equipment will be shared with EE program staff, SCE customers, regulatory bodies, industry groups, and other interested parties to ensure that EE activities are practical.

TTC Goal 1: Contribute to the technology evaluation efforts that accelerate the commercialization of energy efficient measures.

TTC Objective 1.1

Perform independent, unbiased lab testing of existing products, new technologies and control schemes in support of EE goals.

Action Strategy 1.1.1: Actively participate in key industry forums to collect input from major actors including manufacturers, academia, regulatory agencies, EE program staff, and SCE customers to determine areas where testing is needed. Design and conduct tests to deliver results which address the identified needs.

Output for Action Strategy 1.1.1 Share findings with interested parties via technical reports, fact sheets, conference papers, presentations, and training classes. Interested parties may include product designers and manufacturers, installation contractors, EE programs, and end-users.

Action Strategy 1.1.2: Support Emerging Technology and Codes & Standards programs by providing in-house testing capabilities. Many Emerging Technology and Codes & Standards projects have testing components that must be conducted in a laboratory environment to reduce the risk of uncontrollable variables affecting the final results. The TTC has unique testing capabilities and few testing facilities in the U.S. have comparable competencies.

Output for Action Strategy 1.1.2: By 2011, complete construction of ZNE Test Center and begin performing technology evaluations. Also, ensure continued maintenance and availability of existing lighting, HVAC and refrigeration test centers.

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Action Strategy 1.1.3: Reach-out to investor deal flows to find potential energy efficient measures. Create a screening process for investors so they are aware of utility requirements for an energy-efficient measure. Find out what technologies the market is demanding.

Output for Action Strategy 1.1.3: Participate and hold round table meetings with investors.

TTC Goal 2: Contribute to the Strategic Plan goal of ZNE residential construction by 2020, commercial ZNE, including existing buildings, by 2030.

TTC Objective 2.1

Expand test capabilities to include a ZNE Test Center.

Action Strategy 2.1.1: The ZNE Test Center will be built as a state-of-the-art full-functioning laboratory. It will be designed in a modular fashion so that various technologies and equipment can be tested, then replaced with other competing technologies.

Output for Action Strategy 2.1.1: Complete construction of the ZNE Test Center and begin technology evaluations.

TTC Goal 3: Contribute to increased EE awareness of California residents.

TTC Objective 3.1

Effectively disseminate findings of test projects and lessons learned regarding proper application of EE technologies.

Action Strategy 3.1.1: Share findings with diverse audiences.

Output for Action Strategy 3.1.1: Most test projects will result in formal test reports posted on statewide websites. In addition to these reports, information will be incorporated into fact sheets, journal publications, conference presentations and proceedings, training classes, industry handbooks, regulatory proceedings, and EE program materials.

TTC Coordination & Integration

Although the TTC is an SCE-only component of the ETP, the other statewide IOUs have similar test facilities.

- i.** TTC statewide coordination – Test facilities will coordinate to ensure there is no duplication of test efforts.
- ii.** TTC coordination statewide and local EE - Meetings will be conducted and include program managers from statewide and local EE programs to determine where testing

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is most needed. Lab activities will include Emerging Technology and Codes & Standards funded projects.

- iii. TTC coordination with cross-cutting - Meetings will be conducted and include program managers from cross-cutting programs to determine where testing is most needed.
- iv. TTC coordination with IDSM – Test facilities will be open to DSM programs where applicable. Results from all projects will be shared with DSM staff and will educate about potential EE opportunities.
- v. TTC Coordination with External Organizations and Entities - TTC will maintain continuous contact with researchers, manufacturers, distributors, and end-users for the relevant four classes of products. Relationships will continue to be such that information and advice can be shared freely.

TTC Marketing & Outreach/Education & Training

TTC will produce formal test reports for all technology evaluation projects conducted in the laboratories. Results and lessons learned will be incorporated into many information dissemination activities to diverse audiences. Information will be used in presentations at energy centers, joint IOU events, industry conferences, training classes for SCE employees and contractor groups, fact sheets, and industry publications.

TTC will maintain a website with results of completed projects and updates of projects in-progress. This site will be open to the public.

9. Quality Assurance and Evaluation Activities

a) Timeframe of process evaluations and quality assurance activities

The utilities are proposing to work with the Energy Division to develop and submit a comprehensive EM&V Plan for 2009-2011 after the program implementation plans are filed. This will include process evaluations and other program-specific studies within the context of broader utility and Energy Division studies. More detailed plans for process evaluation and other program-specific evaluation efforts cannot be developed until after the final program design is approved by the CPUC and in many cases after program implementation has begun, since plans need to be based on identified program design and implementation issues.

Because the 2009-2011 ETP will contain new program activities, a statewide process evaluation will be conducted as soon as possible during the first full year of the program cycle, as recommended by the California Evaluation Framework for new programs.

The four IOUs will coordinate a statewide process evaluation to ensure that new program elements are being implemented as designed. This statewide process evaluation may be supplemented by utility-specific process evaluations, specifically targeted to activities that the IOU program managers identify as needing timely feedback for purposes of continuous program improvement. These utility-specific process evaluations will be planned and launched on an as-needed basis.

Quality assurance activities are separate from the process evaluations. Quality assurance activities will consist of regular checking and monitoring processes.

Near the beginning of the third full program year, a follow-up statewide process evaluation will assess how well first-year process evaluation recommendations were adopted, and to provide lessons learned and recommendations for planning of post-2011 programs.

Statewide process evaluation scope

The statewide process evaluations will be driven by the researchable issues based upon activities and expected outcomes described in the ETP theory and logic model. The process evaluation will also provide early feedback as to how well the 2009-2011 ETP is progressing toward meeting the goals and objectives stated earlier in this PIP.

The specific researchable issues chosen for the process evaluation will be determined with consultation from the ETP's stakeholders, and will include assessing how effectively adoption information is fed back to the ETP from the EE program's deployment efforts, as requested by the CPUC. The process evaluation tasks will include an update (if needed) of the program theory and logic model. Methods for the process evaluations will include commonly-used methods such as stakeholder interviews, but may also use less-common techniques such as communication/social network analysis.

All process evaluation activities will be guided by the Process Evaluation Protocols in the Evaluators' Protocols (2006, CPUC).

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Quality assurance activities

As part of the quality assurance activities, the ETP managers will provide support for future impact evaluations by increasing documentation activities and creating an evaluation database at the CPUC's request. This database will be accessible to the CPUC and the IOUs, but not the public.

The following reports will be provided on a quarterly basis, at the time the ETP evaluation database is updated:

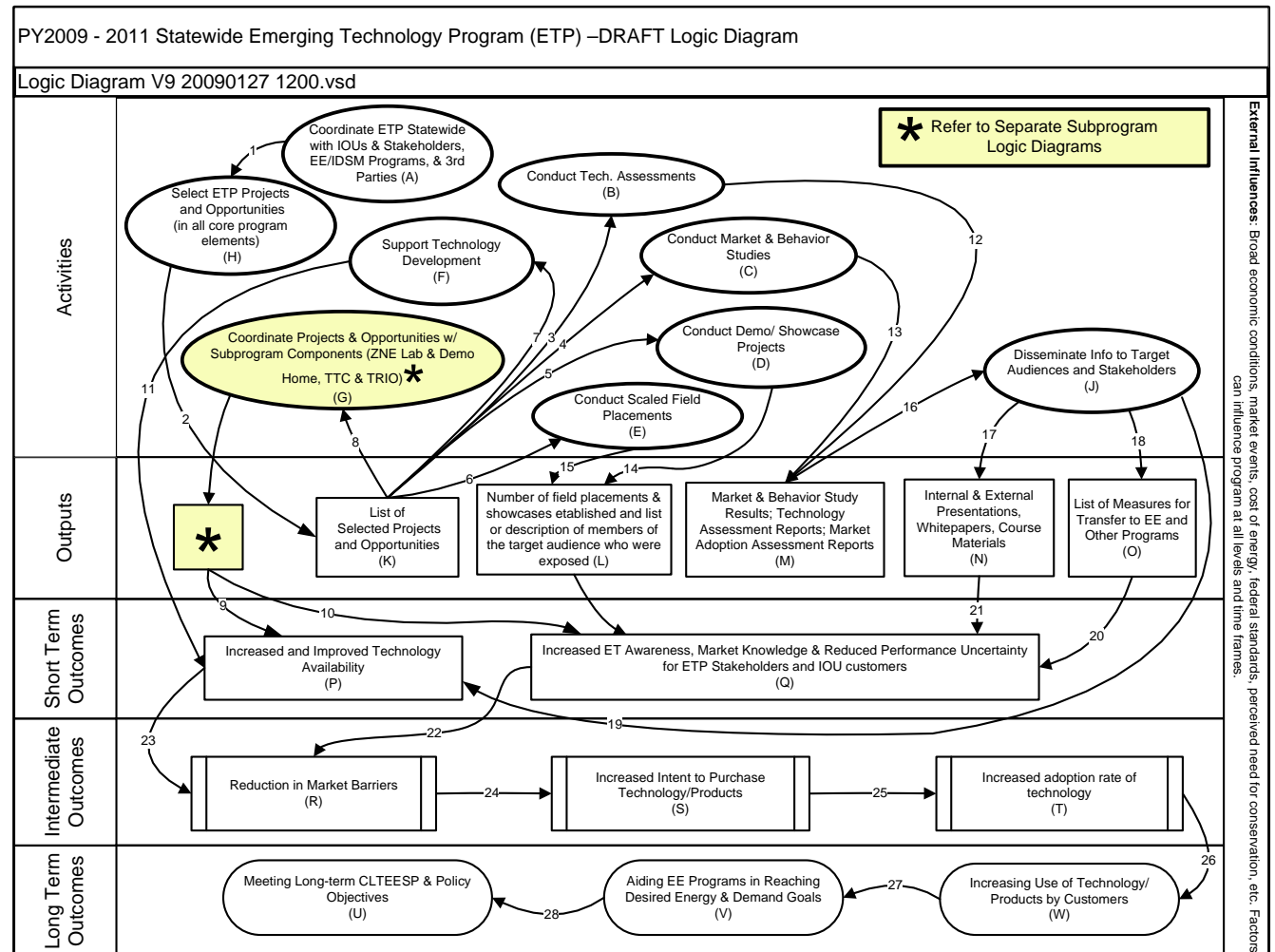
Documentation tasks:

- 1) Use unique measure names to track the adoption of measures deployed through the EE resource programs;
- 2) Update the ETP evaluation database (accessible to the CPUC and the IOUs but not to the public) on a quarterly basis;
- 3) Completed ETP assessment forms and reports electronically compiled into the ETP evaluation database; and
- 4) Metrics for performance indicators will be gathered on a quarterly basis and uploaded into the ETP evaluation database. The specific metrics used will be drawn from metrics used for the aggregate analysis portion of the 2006-2008 ETP impact evaluation.

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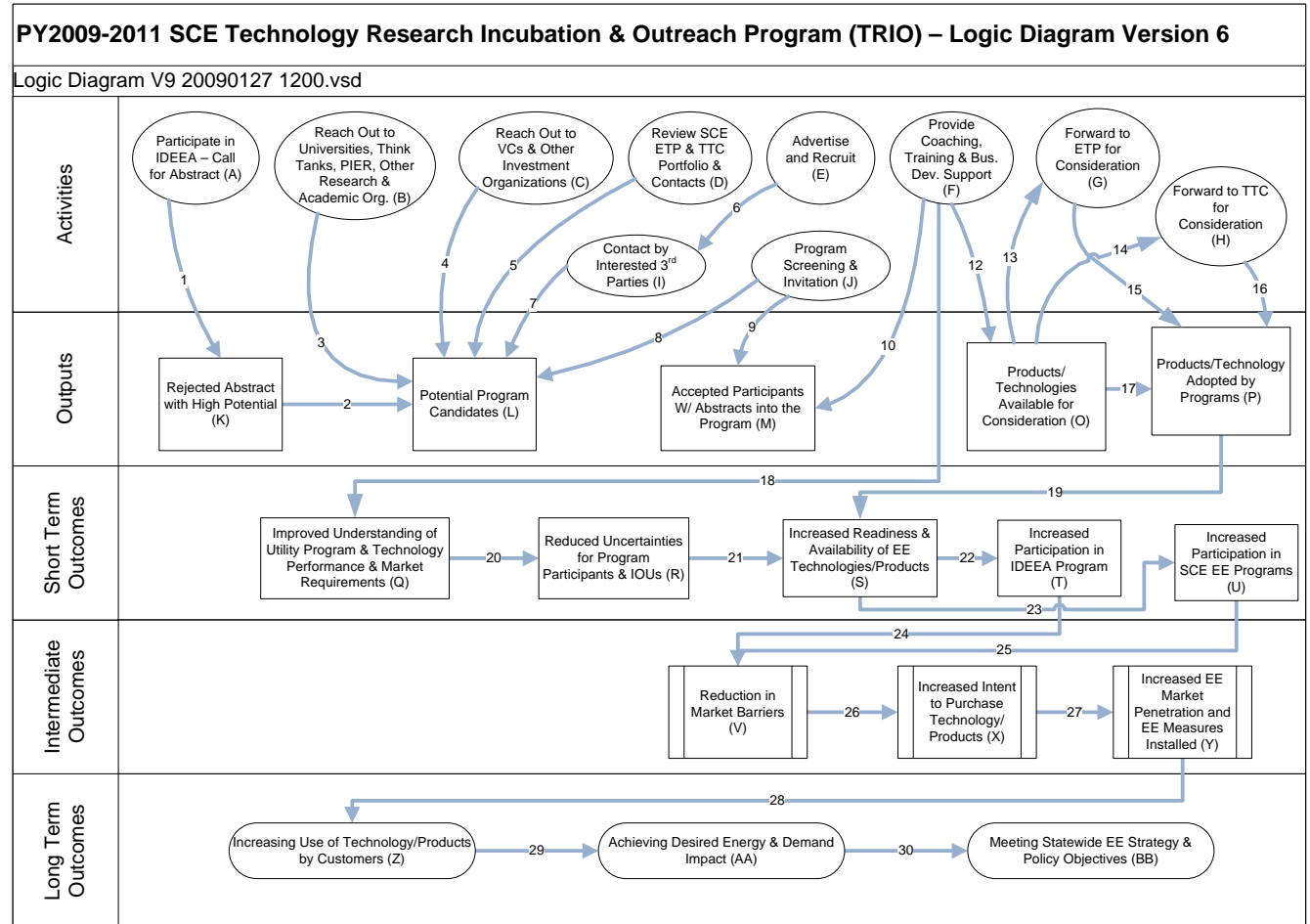
10. Program Logic Model and Performance Indicators

ETP



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TRIO

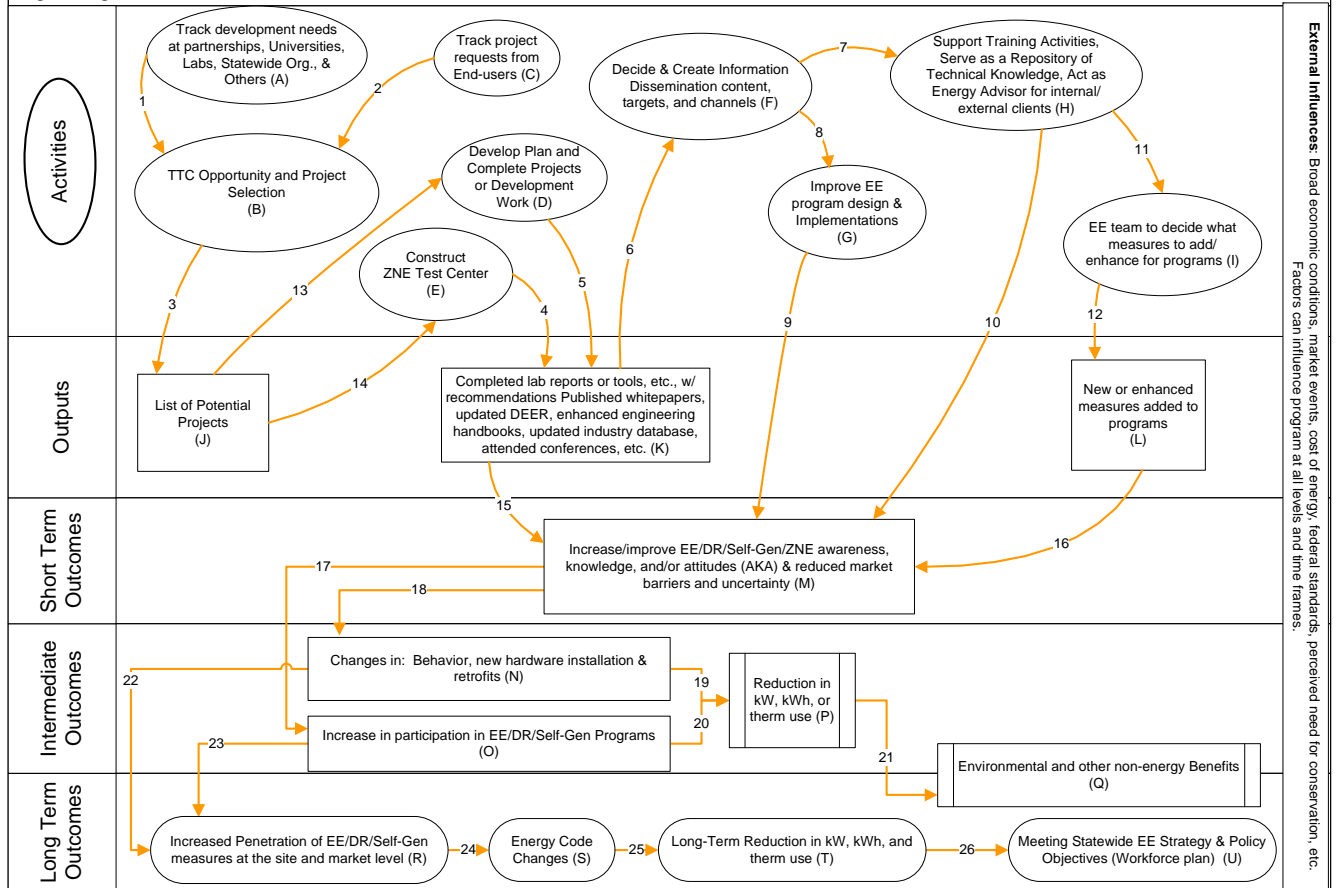


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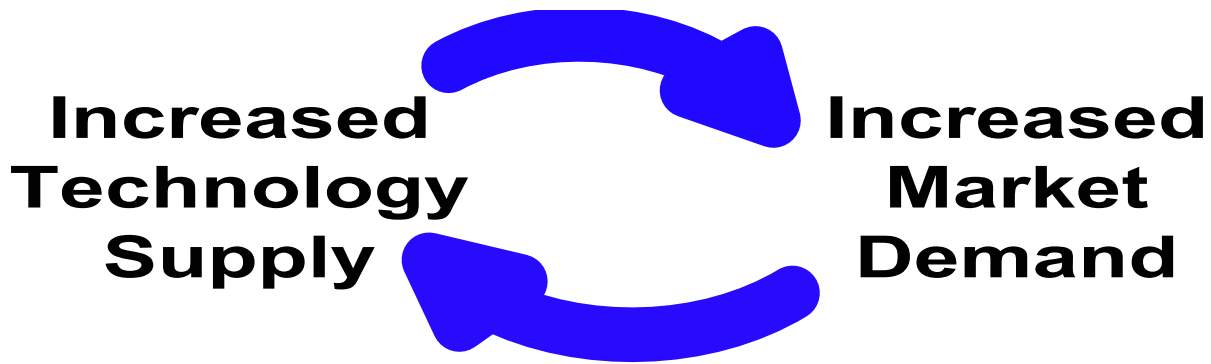
TTC

PY2009-2011 Technology & Testing Center Program (TTC) – Logic Diagram

Logic Diagram V9 20090127 1200.vsd



Technology Push and Market Pull



Activities Increasing Technology Supply

- **Basic Research (Not ET)**
 - Perform technology research
 - Fund universities and labs
- **Support Technology Development (ET)**
 - Provide /collect market intelligence
 - Access to testing facilities
 - Contacts for customer testing/feedback
 - Establish standard test procedures
 - Establish baseline performance levels
 - Access to utility personnel for input
- **Incubation (ET)**
 - General incubation efforts
 - Lend credibility to select companies/ technologies
- **FORESEEABLE market demand (ET collaborates w/ EE)**
 - Future codes/stds announcements
 - Communicate future rebate programs (w/specs)
 - Other future adoption incentives

Activities Increasing Market Demand

- **Assessments – reduce risk (ET)**
 - Work paper data
 - Software updates
- **Scaled Field Placement (ET)**
- **Demonstration Showcases (ET)**
- **Market and Behavioral Studies (ET)**
- **Rebate Programs (EE)**
- **Education / Training (EE)**
- **TOU Rates / Cost Incentives (Regulatory)**

- **Codes & Standards (Codes & Standards)**
- **Social “Green” Marketing (IOU or other)**

Appendix 2

ETP Database Project Naming Convention

The Strategic Plan Strategic Plan sets forth a statewide roadmap to maximize achievement of cost-effective energy efficiency in California's electricity and natural gas sectors between 2009 and 2020, and beyond. Appendix 1 summarizes how the ETP objectives and strategies during the 2009-2011 program cycle contribute to the fulfillment of the Strategic Plan near-term action and steps toward the plan's longer term goals.

ETP Database Project Naming Convention

Strategic Plan			Emerging Technologies PIP	
Section/Goal/Strategies	Partners	Near Term 2009 – 2011	Objective/Strategy	Reference
Section 2.1 - Core Residential Goal 1: ZNE Homes Strategy 1-1: Drive continual advances in technologies in the building envelope, including building materials and systems, construction methods, distributed generation, and building design.	Energy Commission (PIER) Utilities DOE, National Labs Production home Builders and Building Industry Organizations	Advance technological innovation through collaboration of Energy Commission PIER and Emerging Technologies Programs, LBNL, NREL, Utilities, CBIA, and other appropriate organizations.	A key strength of the ETP is the value created through ongoing collaboration among the statewide IOUs. Continuing and enhancing this statewide collaboration will contribute to the successful accomplishment of the ETP goals and objectives of advancing technological innovation through collaboration. Help transform the market by communicating information on high potential ET assessment findings to external stakeholders to advance technological innovation through collaboration. Host input sessions to promote exchange of knowledge, perspectives and ideas two times per year to maximize collaboration efforts. Scan, screen and execute ET projects in the areas of assessments, scaled field placements, demonstration	Section 6 1.2.3 Section 7 1.1.7 3.1.1 1.1.6 3..2 Section 8D

Appendix 2

ETP Database Project Naming Convention

Strategic Plan			Emerging Technologies PIP	
Section/Goal/Strategies	Partners	Near Term 2009 – 2011	Objective/Strategy	Reference
			<p>showcases, market and behavioral studies, and/or technology development support to support ZNE New Residential Construction, ZNE New Commercial Construction, ZNE for Existing Buildings, HVAC Industry and Market Transformation, and related solutions during 2009-2011.</p> <p>SCE’s Technology Test Centers provides state-of-the-art testing facilities for conducting ETP projects and evaluating new technologies in support of the Strategic Plan’s Big Bold strategies Expand PG&E’s Applied Technology Services capabilities to include a laboratory dedicated to testing ZNE measures. PG&E will build a ZNE Demonstration home equipped to allow integrated technology evaluation, training, and educational visits</p>	<p>Section 8B 1.1.1</p> <p>Section 8C 1.1.1</p>
Section 2.1 - Core Residential Goal 1: ZNE Homes	Energy Commission Utilities	<ul style="list-style-type: none"> Assess existing technologies and identify areas for 	Look for targeted opportunities to develop standard test	2.1.3

ETP Database Project Naming Convention

Strategic Plan			Emerging Technologies PIP	
Section/Goal/Strategies	Partners	Near Term 2009 – 2011	Objective/Strategy	Reference
Strategy 1-2: Continual coordination and cooperation between the Energy Commission and others to progressively increase Title 24 building standards and Title 20 appliance standards consistent with the interim and long-term goals set forth in this Plan.	Local governments California Building Standards Commission	<p>strategic involvement in research and development.</p> <ul style="list-style-type: none"> • Map a trajectory for Title 24 mandatory and voluntary standard(s) through 2020. • Progressively make energy efficiency advances permanent by raising Title 24 mandatory standards in 2011 consistent with the trajectory. • Progressively advance Title 24 voluntary, “beyond code” standard(s) and ratings systems in step with changes to the mandatory standards. 	<p>protocols for energy efficient products, in support of statewide Codes & Standards Program including those that progressively raise the efficiency standards, and those that voluntary goes beyond code.</p> <p>SCE’s Technology Test Centers provides state-of-the-art testing facilities for conducting ETP projects and evaluating new technologies in support of the Strategic Plan’s Big Bold strategies</p> <p>Expand PG&E’s Applied Technology Services and SCE’s TTC capabilities to include a laboratory dedicated to testing ZNE measures.</p>	<p>3.3 Section 8D 1.1.2</p> <p>1.1.6 3.2 Section 8B Section 8D</p>
Section 2.1 – Core Residential Goal 2: Existing Homes Strategy 2-2: Promote effective decision-making to create widespread demand for energy efficiency measures.	Utilities Home improvement industry Real estate industry assns Local governments	<ul style="list-style-type: none"> • Complete initial market research to determine homeowner “decision triggers” to improving home energy efficiency, including an assessment of the impact of EE or carbon labeling. 	<p>Perform primary IDSM related market and behavior studies to enhance market intelligence of customer needs and “decision triggers” to improve acceptance of new or under-utilized energy efficiency technology.</p>	<p>1.5.1</p> <p>2.1.2</p>

Appendix 2

ETP Database Project Naming Convention

Strategic Plan			Emerging Technologies PIP	
Section/Goal/Strategies	Partners	Near Term 2009 – 2011	Objective/Strategy	Reference
		<ul style="list-style-type: none"> • Develop, launch, monitor and continuously improve campaigns to raise demand for lower energy homes, including home energy or carbon labeling programs. • Actively support local governments considering RECOs to improve the energy performance of existing homes at time of sale or during major renovations. • Develop and implement home rating system pilot projects based on the Energy Commission HERS program. 	Look for targeted opportunities to establish product baseline performance levels, including home labeling.	
<p>Section 2.1 - Core Residential</p> <p>Goal 2: Existing Homes</p> <p>Strategy 2-3: Manage research into new/advanced cost-effective innovations to reduce energy use in existing homes</p>	<p>Energy Commission</p> <p>DOE/National labs</p> <p>Utilities</p>	<ul style="list-style-type: none"> • Gather and disseminate information on advanced retrofits. • Advance technological innovation through collaboration of Energy Commission PIER and Emerging Technologies Programs, Utilities and other appropriate organizations. • Promote 	<p>Scan a wide variety of sources for measures that could help IOUs meet customer needs and achieve energy savings, demand reduction, and other IDSM targets. .</p> <p>Host input sessions to promote exchange of knowledge, perspectives and ideas two times per year to maximize collaboration efforts.</p>	<p>1.1.1</p> <p>1.1.7</p> <p>Section 6</p>

Appendix 2

ETP Database Project Naming Convention

Strategic Plan			Emerging Technologies PIP	
Section/Goal/Strategies	Partners	Near Term 2009 – 2011	Objective/Strategy	Reference
		commercialization of home energy management tools including AMI-based monitoring and display tools.	A key strength of the ETP is the value created through ongoing collaboration among the statewide IOUs. Continuing and enhancing this statewide collaboration will contribute to the successful accomplishment of the ETP goals and objectives of advancing technological innovation through collaboration. Help transform the market by communicating information on high potential ET assessment findings to external stakeholders to advance technological innovation through collaboration. Look for targeted opportunities to provide customer contacts for testing and focus groups. Look for targeted opportunities to make expertise / knowledgeable personnel available as resources to	1.2.3 Section 7 2.1.4 2.1.6 2.1.7

Appendix 2

ETP Database Project Naming Convention

Strategic Plan			Emerging Technologies PIP	
Section/Goal/Strategies	Partners	Near Term 2009 – 2011	Objective/Strategy	Reference
			product developers. Look for targeted opportunities to make testing facilities and/or other infrastructure available to multiple product developers	
Section 2.1 - Core Residential Goal 3: Plug In Loads Strategy 3-1 Drive continual advances in residential energy usage, including plug loads, home energy management systems, and appliances.	Energy Commission (PIER) Utilities LBNL Appliance manufacturers Retailers	<ul style="list-style-type: none"> • Work with research organizations to develop smarter products with lower energy requirements. • Work with manufacturers to raise product energy efficiency, both when in use and when in standby mode. 	A key strength of the ETP is the value created through ongoing collaboration among the statewide IOUs. Continuing and enhancing this statewide collaboration will contribute to the successful accomplishment of the ETP goals and objectives of advancing smarter products with lower energy requirements through collaboration. Help transform the market by communicating information on high potential ET assessment findings to external stakeholders to advance technological innovation through collaboration. Scan a wide variety of sources for measures that could	Section 6 1.2.3 Section 7 1.1.1

ETP Database Project Naming Convention

Strategic Plan			Emerging Technologies PIP	
Section/Goal/Strategies	Partners	Near Term 2009 – 2011	Objective/Strategy	Reference
			help IOUs meet customer needs and achieve energy savings, demand reduction, and other IDSM targets. .	
Section 2.1 - Core Residential Goal 3: Plug In Loads Strategy 3-3: Create demand for such products through market transformation activities	Utilities Industry partners	<ul style="list-style-type: none"> • Deploy package of rebates, incentives and voluntary industry agreements to bring significant numbers of the best current technologies for managing plug loads (e.g., smart power strips and informative visual displays) to market. • Promote unbiased labels and Web sites (Consumer Reports approach). 	Identify targeted opportunities to develop forward looking product specifications which could be used by a multitude of product developers. This effort could be most effective if the opportunity exists to tie future rebates or other incentives to the specifications Look for targeted opportunities to establish product baseline performance levels.	2.1.1 2.1.2
Section 2.1 - Core Residential Goal 3: Plug In Loads Strategy 3-4: Continuously strengthen standards, including the expansion of both Title 24 and 20 to codify advances in plug load management	Energy Commission Utilities	Continuously incorporate gains in efficiency in the appliance standards.	Look for targeted opportunities to establish product baseline performance levels leading to gains in efficiency in appliance standards Look for targeted opportunities to develop standard test protocols for energy efficient products, in support of statewide Codes & Standards Program, including	2.1.2 2.1.3

Appendix 2

ETP Database Project Naming Convention

Strategic Plan			Emerging Technologies PIP	
Section/Goal/Strategies	Partners	Near Term 2009 – 2011	Objective/Strategy	Reference
			gains efficiency in appliance standards.	
Section 2.1 - Core Residential Goal 4: High Performance Lighting Strategy 4-1 Drive continual advances in lighting technology through research programs and design competitions.	Energy Commission (PIER) Universities DOE National Labs Manufacturers Utilities Retailers	<ul style="list-style-type: none"> • Work with research organizations to develop lighting products with lower energy requirements and improved spectral performance. • Work with Utilities and Retailers to develop public awareness and demand. 	<p>Scan a wide variety of sources, including lighting, for measures that could help IOUs meet customer needs and achieve energy savings, demand reduction, and other IDSM targets. A key strength of the ETP is the value created through ongoing collaboration among the statewide IOUs. Continuing and enhancing this statewide collaboration will contribute to the successful accomplishment of the ETP goals and objectives of advancing technological innovation through collaboration. Help transform the market by communicating information on high potential ET lighting assessment findings to external stakeholders to develop lighting products with lower energy requirements and improved spectral</p>	<p>1.1.1</p> <p>Section 6</p> <p>1.2.3 Section 7</p> <p>2.1.1</p> <p>2.1.4</p> <p>2.1.6</p> <p>2.1.7</p>

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ETP Database Project Naming Convention

Strategic Plan			Emerging Technologies PIP	
Section/Goal/Strategies	Partners	Near Term 2009 – 2011	Objective/Strategy	Reference
			<p>performance. Identify targeted opportunities to develop forward looking product specifications which could be used by a multitude of product developers resulting in lower energy requirements and improved spectral performance. Look for targeted opportunities to provide customer contacts for testing and focus groups. Look for targeted opportunities to make expertise / knowledgeable personnel available as resources to product developers. Look for targeted opportunities to make testing facilities and/or other infrastructure available to multiple product developers. SCE's Technology Test Centers provides state-of-the-art testing facilities for conducting ETP projects and evaluating new technologies in</p>	<p>3.3 1.1.6 3.2 Section 8B Section 8D</p>

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ETP Database Project Naming Convention

Strategic Plan			Emerging Technologies PIP	
Section/Goal/Strategies	Partners	Near Term 2009 – 2011	Objective/Strategy	Reference
			support of the Strategic Plan’s Big Bold strategies Expand PG&E’s Applied Technology Services and SCE’s TTC capabilities to include a laboratory dedicated to testing ZNE measures.	
Section 2.1 - Core Residential Goal 4: High Performance Lighting Strategy 4-2: Create demand for improved lighting products through demonstration projects, marketing efforts, and utility programs.	Utilities Industry partners	Deploy package of rebates, incentives and voluntary industry agreements to bring significant numbers of the best available lighting technologies (SSL) to market.	Develop IOU Demonstration Showcases to educate stakeholders on the performance of measures. Identify targeted opportunities to develop forward looking product specifications which could be used by a multitude of product developers that will bring a significant numbers of the best available technologies to market.	1.4 2.1.1
Section 2.1 - Core Residential Goal 4: High Performance Lighting Strategy 4.5: Ensure environmental safety of CFLs and other emerging lighting solutions	CPUC Utilities Retailers DOE / EPA Cal EPA CA Dept. of Toxic Substances Control AB 1109	Establish minimum mercury content requirements on the CFL manufacturers participating in utility programs.	Look for targeted opportunities to establish product baseline performance levels, including minimum mercury content for CFL. Look for targeted opportunities to develop standard test	2.1.2 2.1.3

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ETP Database Project Naming Convention

Strategic Plan			Emerging Technologies PIP	
Section/Goal/Strategies	Partners	Near Term 2009 – 2011	Objective/Strategy	Reference
	Lighting Task Force		protocols for energy efficient products, in support of statewide Codes & Standards Program, including minimum mercury content for CFL. SCE’s Technology Test Centers provides state-of-the-art testing facilities for conducting ETP projects and evaluating new technologies in support of the Strategic Plan’s Big Bold strategies Expand PG&E’s Applied Technology Services and SCE’s TTC capabilities to include a laboratory dedicated to testing ZNE measures.	3.3 Section 8D 1.1.2 1.1.6 3.2 Section 8B Section 8D
Section 3 - Commercial Sector Goal 1: ZNE Commercial Buildings Strategy 1-1: Establish a long-term progressive path of higher minimum codes and standards ending with ZNE codes and standards for all new buildings by	Energy Commission Utilities BSC A&E firms Building industry	<ul style="list-style-type: none"> Establish one- or two-tiered voluntary EE standards, coordinated with green building rating systems. Align Title 24 targets with goals of AB 32 and carbon reduction. 	Look for targeted opportunities to establish product baseline performance levels Look for targeted opportunities to develop standard test protocols for energy efficient products, in support of statewide Codes & Standards Program, including aligning EE standards with GHG	2.1.2 2.1.3 Section 8B

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ETP Database Project Naming Convention

Strategic Plan			Emerging Technologies PIP	
Section/Goal/Strategies	Partners	Near Term 2009 – 2011	Objective/Strategy	Reference
2030.			reduction.	
Section 3 - Commercial Sector Goal 1: ZNE Commercial Buildings Strategy 1-3 Establish a “Path to Zero” Campaign to create demand for high- efficiency buildings.	DOE and other ZNE efforts Building industries Building owners A&E firms Local and regional Governments Utilities	<ul style="list-style-type: none"> • Convene leading building industry associations to plan and conduct campaign. • Organize forums to develop and exchange experience and data on Emerging Technologies, practices and designs that deliver ultra-low and ZNE buildings. 	Host input sessions to promote exchange of knowledge, perspectives and ideas regarding ET practices and designs two times per year to maximize collaboration efforts. A key strength of the ETP is the value created through ongoing collaboration among the statewide IOUs. Continuing and enhancing this statewide collaboration will contribute to the successful accomplishment of the ETP goals and objectives. SCE’s Technology Test Centers provides state-of-the-art testing facilities for conducting ETP projects and evaluating new technologies in support of the Strategic Plan’s Big Bold strategies Expand PG&E’s Applied Technology Services and SCE’s TTC capabilities to include a laboratory	1.1.7 Section 6 3..3 1.1.6 3.2 Section 8B Section 8D Section 8C 1.1.1

ETP Database Project Naming Convention

Strategic Plan			Emerging Technologies PIP	
Section/Goal/Strategies	Partners	Near Term 2009 – 2011	Objective/Strategy	Reference
			dedicated to testing ZNE measures. PG&E will build a ZNE Demonstration home equipped to allow integrated technology evaluation, training, and educational visits	
Section 3 - Commercial Sector Goal 1: ZNE Commercial Buildings Strategy 1-6: Develop a multi- pronged approach to advance the practice of integrated design.	Integrated Design Working Group Utilities AIA CAB Architectural schools Building and Building products Industry ASHRAE USGBCI	<ul style="list-style-type: none"> Promote ID development via Title 24 codes/ standards and market activities. Identify/develop tools and protocols from building commissioning, retro-commissioning and building M&V to enable ID to be deployed. Form partnerships with industry and architectural/engineering schools to promote the practice of and education in ID. 	Look for targeted opportunities to develop standard test protocols for energy efficient products, in support of statewide Codes & Standards Program, including the promotion of integrated design. A key strength of the ETP is the value created through ongoing collaboration among the statewide IOUs. Continuing and enhancing this statewide collaboration will contribute to the successful accomplishment of the ETP goals and objectives of advancing technological innovation through collaboration.	2.1.3 Section 6
Section 3 - Commercial Sector Goal 2: Existing	Utilities Industry Partners	Test and deploy package of rebates, incentives and	Scan a wide variety of sources for measures, including	1.1.1

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ETP Database Project Naming Convention

Strategic Plan			Emerging Technologies PIP	
Section/Goal/Strategies	Partners	Near Term 2009 – 2011	Objective/Strategy	Reference
Buildings Strategy 2.8. Improve utilization of plug load technologies within the commercial sector.		voluntary industry agreements to bring significant numbers of the best available technologies for managing plug loads within the commercial sector.	technologies for managing plug loads that could help IOUs meet customer needs and achieve energy savings, demand reduction, and other IDSM targets. Identify targeted opportunities to develop forward looking product specifications which could be used by a multitude of product developers that will bring a significant numbers of the best available 1 technologies to market.	2.1.1
Section 3 - Commercial Sector Goal 3 – (this is nit picky, but sometimes we use a hyphen and sometimes a colon) High Performance Lighting Strategy 3-1: Drive continual advances in lighting technology through research programs and design competitions.	Energy Commission (PIER) Universities National Labs Manufacturers Utilities Retailers	<ul style="list-style-type: none"> • Work with research organizations to develop lighting products with lower energy requirements and improved spectral performance. • Work with Utilities and Retailers to develop public awareness and demand. 	Scan a wide variety of sources for measures, including lighting technologies that could help IOUs meet customer needs and achieve energy savings, demand reduction, and other IDSM targets. A key strength of the ETP is the value created through ongoing collaboration among the statewide IOUs. Continuing and enhancing this statewide collaboration will	1.1.1 Section 6 1.2.3 Section 7

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ETP Database Project Naming Convention

Strategic Plan			Emerging Technologies PIP	
Section/Goal/Strategies	Partners	Near Term 2009 – 2011	Objective/Strategy	Reference
			<p>contribute to the successful accomplishment of the ETP goals and objectives of advancing technological innovation through collaboration. Help transform the market by communicating information on high potential ET lighting assessment findings to external stakeholders to develop lighting products with lower energy requirement and improved spectral performance. Look for targeted opportunities to provide customer contacts for testing and focus groups. Look for targeted opportunities to make expertise / knowledgeable personnel available as resources to product developers. Look for targeted opportunities to make testing facilities and/or other infrastructure available to multiple product developers.</p>	<p>2.1.4</p> <p>2.1.6</p> <p>2.1.7</p>

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ETP Database Project Naming Convention

Strategic Plan			Emerging Technologies PIP	
Section/Goal/Strategies	Partners	Near Term 2009 – 2011	Objective/Strategy	Reference
		proprietary efforts.	prioritize needed RD&D/ET projects A key strength of the ETP is the value created through ongoing collaboration among the statewide IOUs. Continuing and enhancing this statewide collaboration of research activities will contribute to the successful accomplishment of the ETP goals and objectives of advancing technological innovation through collaboration.	
Section 6 - HVAC Goal 1 Improve Code Compliance Strategy 1-1: Develop streamlined local government HVAC permitting systems, including on-line HVAC replacement permitting.	Local Governments CALBO Utilities Distributors Contractors	Convene an industry/local government stakeholder group; develop proposed new system; pilot test with local governments.	A key strength of the ETP is the value created through ongoing collaboration among the statewide IOUs. Continuing and enhancing this statewide collaboration will contribute to the successful accomplishment of the ETP goals and objectives.	Section 6
Section 6 - HVAC Goal 3 Whole Building Design	CEC HVAC industry	<ul style="list-style-type: none"> • Pilot targeted programs. • Incorporate radiant 	ET will provide information from assessments that	1.2.2

ETP Database Project Naming Convention

Strategic Plan			Emerging Technologies PIP	
Section/Goal/Strategies	Partners	Near Term 2009 – 2011	Objective/Strategy	Reference
Strategy 3-1: Aggressively promote whole building design concepts that improve the overall thermal integrity of new and existing structures.	Architects Builders and Contractors Utilities Local Governments	cooling, ductless systems, ground source heat pumps, etc. into 5 percent of new and existing construction by 2011. <ul style="list-style-type: none"> Review priorities of PIER and Emerging Technologies program activities to more fully support newer HVAC technologies and systems. 	could help IOU's IDSM resource acquisition programs create new measures, or revise/integrate existing measures, that increase energy savings in a variety of market sectors Conduct scaled field placements to increase market acceptance and traction for new and under-utilized measures. A key strength of the ETP is the value created through ongoing collaboration among the statewide IOUs. Continuing and enhancing this statewide collaboration of research activities will contribute to the successful accomplishment of the ETP goals and objectives of advancing HVAC innovation through collaboration.	1.3.3 Section 6
Section 6 - HVAC Goal 3 Whole Building Design Strategy 3-2: Accelerate activities	ASHRAE Energy Commission Utilities Manufacturers	Evaluate and update existing standards to include increased emphasis on HVAC aspects of whole	Look for targeted opportunities to develop HVAC standard test protocols for energy	2.1.3

ETP Database Project Naming Convention

Strategic Plan			Emerging Technologies PIP	
Section/Goal/Strategies	Partners	Near Term 2009 – 2011	Objective/Strategy	Reference
related to HVAC aspects of whole building industry design standards.	AHRI	building approaches.	efficient products, in support of statewide Codes & Standards Program, with emphasis on HVAC aspects of whole building approaches.	
Section 6 – HVAC Goal 4 New HVAC Technologies and System Diagnostics Strategy 4-2: Update “Total Avoided Cost Model” and Title 24 “Time Dependent Valuation” calculations, including use of peak energy values.	Energy Commission Utilities	Evaluate, revise and update as needed in State and Federal applications.	Look for targeted opportunities to develop and update standard test protocols and tools for energy efficient products, in support of statewide Codes & Standards Program.	2.1.3
Section 6 - HVAC Goal 4 New HVAC Technologies and System Diagnostics Strategy 4-3: Accelerate market penetration of advanced technologies by HVAC industry promotions and updating/expanding current utility programs to include the new technologies as appropriate.	Utilities Energy Commission	<ul style="list-style-type: none"> Conduct a comprehensive cost-benefit analysis of leading and prospective advanced technologies, and use to prioritize utility incentive offerings and HVAC industry deployment strategies Establish an incubator program to accelerate commercialization of most promising technologies. 	Execute a screening process for assessment candidates designed to ensure that the ET team focuses its time and resources on measures most effectively. Conduct ET assessments to evaluate performance uncertainties and/or other attributes potential effectiveness / impact in reducing energy consumption and peak demand of new and/or under-utilized	1.1.2 1.1.3 Objective 2.2 Section 8A

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ETP Database Project Naming Convention

Strategic Plan			Emerging Technologies PIP	
Section/Goal/Strategies	Partners	Near Term 2009 – 2011	Objective/Strategy	Reference
			measures, including cost-benefit analysis of project. Technology Resource Incubator Outreach Program (TRIO). TRIO is a statewide program that is focused on providing training and networking for developers of energy saving technologies.	
Section 6 - HVAC Goal 4 New HVAC Technologies and System Diagnostics Strategy 4-4: Adopt a progressive set of building codes that support the deployment of peak efficient equipment.	Energy Commission Utilities AHRI ASHRAE ACCA	Enhance and accelerate the deployment of Title 20/24 codes.	Look for targeted opportunities to establish product baseline performance levels, leading to enhanced and accelerated deployment of code and or standard. Look for targeted opportunities to develop standard test protocols for energy efficient products, in support of statewide Codes & Standards Program, leading to enhanced and accelerated deployment of code and or standard.	2.1.2 2.1.3
Section 7 - Codes & Standards Goal 1 Code Enhancement and Expansion Strategy 1-5: Improve		Develop and implement plan for enhanced coordination and integration of codes and standards with full spectrum of EE market	Look for targeted opportunities to develop standard test protocols for energy efficient products, in support of enhance	2.1.3

ETP Database Project Naming Convention

Strategic Plan			Emerging Technologies PIP	
Section/Goal/Strategies	Partners	Near Term 2009 – 2011	Objective/Strategy	Reference
coordination of energy codes and standards with utility programs.		transformation, including Emerging Technologies promotion, deployment, incentives, consumer education, etc.	coordination and integration of statewide Codes & Standards Program. Help transform the market by communicating information on high potential ET assessment findings to external stakeholders to develop and implement plans for enhanced coordination and integration of codes and standards.	1.2.3 Section 7
Section 8 – DSM Coordination and Integration Goal 1: Integrated DSM Programs, Messages and Technologies Strategy 1.4: Promote development and support of new technologies that enable or facilitate DSM Coordination and Integration		<ul style="list-style-type: none"> Assess the current state of integration-enabling technology and develop a guidance document detailing a technology development path for fuller integration. (2009) Prioritize integration-enabling technologies in RD&D and ET programs based on the technology assessment. 	The ETP will provide information to internal stakeholders from integration-enabling technology assessments that could help IOU's IDSM resource acquisition programs create new measures, or revise/integrate existing measures, that increase energy savings in a variety of market sectors, The ET screening process will produce a list of scored, approved, and funded measures for assessment. Based on the prioritization results,	1.2.2 1.1.2 1.1.8 PG&E Only

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ETP Database Project Naming Convention

Strategic Plan			Emerging Technologies PIP	
Section/Goal/Strategies	Partners	Near Term 2009 – 2011	Objective/Strategy	Reference
			create and execute three-year ET program plans (roadmaps) in selected portfolio areas detailing technology development path to implementation and integration.	
Section 11- Research and Technology Goal 1: Create Demand Pull for New Technology Strategy 1-1: Apply systems approaches to establishing research priorities		<ul style="list-style-type: none"> Collaborate with regional and national labs, manufacturers, universities to develop and enhance technologies that can help meet the statewide strategic EE/DR goals. Form Utility advisory group to formally provide input into PIER research strategies and programs and coordinate with ETCC promotion process. Target most promising opportunities for improving plug-loads, lighting, and integrated DSM information & control systems. Refine ET and PIER process to encourage more rapid evaluation of 	<p>Scan a wide variety of sources for measures that could help IOUs meet customer needs and achieve energy savings, demand reduction, and other IDSM targets. .</p> <p>A key strength of the ETP is the value created through ongoing collaboration among the statewide IOUs. Continuing and enhancing this statewide collaboration will contribute to the successful accomplishment of the ETP goals and objectives of advancing technological innovation through collaboration.</p> <p>Help transform the market by communicating</p>	<p>1.1.1</p> <p>Section 6</p> <p>1.2.3 Section 7</p> <p>2.1.1</p> <p>2.1.4</p> <p>2.1.6</p>

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ETP Database Project Naming Convention

Strategic Plan			Emerging Technologies PIP	
Section/Goal/Strategies	Partners	Near Term 2009 – 2011	Objective/Strategy	Reference
		Emerging Technologies.	information on high potential ET lighting assessment findings to external stakeholders to help meet the statewide strategic EE/DR goals. Identify targeted opportunities to develop forward looking product specifications which could be used by a multitude of product developers that will bring a significant numbers of the best available technologies to market. Look for targeted opportunities to provide customer contacts for testing and focus groups. Look for targeted opportunities to make expertise / knowledgeable personnel available as resources to product developers. Look for targeted opportunities to make testing facilities and/or other infrastructure available to multiple product developers.	2.1.7
Section 11- Research and Technology		<ul style="list-style-type: none"> Expand Federal government R&D 	Develop and maintain a project	1.1.4

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ETP Database Project Naming Convention

Strategic Plan			Emerging Technologies PIP	
Section/Goal/Strategies	Partners	Near Term 2009 – 2011	Objective/Strategy	Reference
<p>Goal 1: Create Demand Pull for New Technology</p> <p>Strategy 1-2: Leverage private industry and Federally funded technology research and investment</p>		<p>support for and integration with California’s efforts.</p> <ul style="list-style-type: none"> • Create an investor-ET network to share market information, technology assessment results, and expedited access to incentive programs. • Pilot incubator program to fast track ET deployment. • Expand upstream relationships and channels to effectively target and generate support for energy-related technology. 	<p>tracking database containing the variables and attributes to be tracked quarterly by all ETCC programs statewide, and data will be reported to the CPUC on a regular basis.</p> <p>A key strength of the ETP is the value created through ongoing collaboration among the statewide IOUs. Continuing and enhancing this statewide collaboration will contribute to the successful accomplishment of the ETP goals and objectives of advancing technological innovation through collaboration.</p> <p>Help transform the market by communicating information on high potential ET lighting assessment findings to external stakeholders to share market information, technology assessment result and to expedite access to incentive</p>	Section 6
				1.2.3 Section 7
				2.1.4
				2.1.6
				2.1.7
2.2 Section 8A				

ETP Database Project Naming Convention

Strategic Plan			Emerging Technologies PIP	
Section/Goal/Strategies	Partners	Near Term 2009 – 2011	Objective/Strategy	Reference
efficient technologies.		<p>influences in Emerging Technologies project screening.</p> <ul style="list-style-type: none"> Assess technology specific market potential using secondary market research to obtain technical and economic potential on new and Emerging Technologies and market segments. 	<p>efficiency technology.</p> <p>Review and analyze secondary research to obtain technical and economic potential of advance technological innovations</p> <p>Look for targeted opportunities to conduct market or behavioral studies and otherwise provide and/or collect market intelligence. .</p> <p>Based on the prioritization results, create and execute three-year ET program plans (roadmaps) in selected portfolio areas detailing technology development path to implementation and integration</p>	<p>2.1.5</p> <p>1.1.8 PG&E Only</p>
<p>Section 11- Research and Technology</p> <p>Goal 1: Create Demand Pull for New Technology</p> <p>Strategy 1-4: Expand activities to create market pull for energy-efficient technologies</p>		<ul style="list-style-type: none"> Plan and launch knowledge management systems. Explore customer / manufacturer targeted strategies for creating demand. 	<p>Develop and maintain a project tracking database containing the variables and attributes to be tracked quarterly by all ETCC programs statewide, and data will be reported to the CPUC on a</p>	<p>1.1.4</p> <p>2.1.1</p>

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ETP Database Project Naming Convention

Strategic Plan			Emerging Technologies PIP	
Section/Goal/Strategies	Partners	Near Term 2009 – 2011	Objective/Strategy	Reference
			regular basis. Identify targeted opportunities to develop forward looking product specifications which could be used by a multitude of product developers.	
Section 11- Research and Technology Goal 2: Targeted R&D Strategy 2-1: Develop general R&D community support for support Big Bold Initiatives		Convene collaboration among researchers and their funders to ensure alignment of activities with big, bold focus areas for ZNE buildings and hot dry climate HVAC technologies and systems.	A key strength of the ETP is the value created through ongoing collaboration among the statewide IOUs. Continuing and enhancing this statewide collaboration will contribute to the successful accomplishment of the ETP goals and objectives. Host input sessions to promote exchange of knowledge, perspectives and ideas regarding ET practices and designs two times per year to maximize collaboration efforts.	Section 6 1.1.7
Section 11- Research and Technology Goal 2: Targeted R&D Strategy 2-2: Promote cost-effective near-term performance enhancements of existing		<ul style="list-style-type: none"> Target building shell, HVAC, lighting and supporting areas, such as real-time energy performance monitoring and automated building commissioning 	Scan a wide variety of sources for measures, including lighting technologies that could help IOUs meet customer needs and achieve energy savings, demand	1.1.1 2.1.4

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ETP Database Project Naming Convention

Strategic Plan			Emerging Technologies PIP	
Section/Goal/Strategies	Partners	Near Term 2009 – 2011	Objective/Strategy	Reference
technologies		<p>technologies.</p> <ul style="list-style-type: none"> • Collaborate with manufacturers to improve performance of existing technologies. • Develop specifications to drive / guide improvement activities. Provide technology feedback through ET assessments. • Explore longer term strategies to increase saturation of new big and bold measures and technologies. 	<p>reduction, and other IDSM targets. .</p> <p>Look for targeted opportunities to provide customer contacts for testing and focus groups.</p> <p>Look for targeted opportunities to make expertise / knowledgeable personnel available as resources to product developers.</p> <p>Look for targeted opportunities to make testing facilities and/or other infrastructure available to multiple product developers.</p> <p>A key strength of the ETP is the value created through ongoing collaboration among the statewide IOUs. Continuing and enhancing this statewide collaboration will contribute to the successful accomplishment of the ETP goals and objectives.</p> <p>Look for targeted opportunities to develop forward looking product</p>	<p>2.1.6</p> <p>2.1.7</p> <p>Section 6</p> <p>2.1.1</p>

ETP Database Project Naming Convention

Strategic Plan			Emerging Technologies PIP	
Section/Goal/Strategies	Partners	Near Term 2009 – 2011	Objective/Strategy	Reference
			specifications which could be used by a multitude of product developers to improve performance and efficiency.	
Section 11- Research and Technology Goal 2: Targeted R&D Strategy 2-3: Develop initiatives aimed at PIER to support larger gains in support of Big Bold Initiatives.		<ul style="list-style-type: none"> • Provide stakeholder input to ensure alignment of PIER activities with Big, Bold Initiatives. • Collaborate with PIER to develop a formal process to roll PIER developed technologies into ET. 	A key strength of the ETP is the value created through ongoing collaboration among the statewide IOUs. Continuing and enhancing this statewide collaboration will contribute to the successful accomplishment of the ETP goals and objectives.	Section 6
Section 11- Research and Technology Goal 2: Targeted R&D Strategy 2-4: Develop initiatives aimed at ET to support Big Bold Initiatives.		<ul style="list-style-type: none"> • Embark on plan to demonstrate big bold measures in customer sites and seed the market. • Conduct “pilot” programs of new technology seeding and market uptake through subsidies and incentives. • Collaborate with manufacturers in new ambitious pilot programs, including full-scale demonstration programs to mature innovative system 	Conduct at scaled field placements during the program period to increase market understanding and traction for new and under-utilized measures. Develop IOU Demonstration Showcases to educate stakeholders on the performance of measures. PG&E is proposing the ZNE Demonstration Home as a one-stop solution for the testing and	1.3.3 1.4.3 Section 8C Section 6

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ETP Database Project Naming Convention

Strategic Plan			Emerging Technologies PIP	
Section/Goal/Strategies	Partners	Near Term 2009 – 2011	Objective/Strategy	Reference
		technologies.	demonstration of integrated ZNE measures, providing hands-on technical training, and fueling the imagination of market actors and end users alike. A key strength of the ETP is the value created through ongoing collaboration among the statewide IOUs. Continuing and enhancing this statewide collaboration in full-scale demonstrations will contribute to the successful accomplishment of the ETP goals and objectives.	
Section 12 – Local Governments Goal 3: Lead by Example Strategy 3-5: Develop an innovation incubator that competitively selects energy design, technology, and system initiatives for local government pilot projects.		<ul style="list-style-type: none"> • Coordinate this approach with Research & Technology activities; • Develop and begin first projects by 12/2009. 	Technology Resource Incubator Outreach Program (TRIO). TRIO is a statewide program that is focused on providing training and networking for developers of energy saving technologies.	2.2 Section 8A

Appendix 3

ETP Database Project Naming Convention

The ETP database project naming convention will be as follows:

ETP_CCYY_0000_UUUU_FF_TTTTTTTTTTTTTTTTTTTTTTTTTT

CCYY is the year when the project was initiated (funding approved)

0000 is a four-digit numerical identification code for the project.

Four-digit identification codes beginning with 1, 2, or 3 will be assigned by SCE; 4, 5, or 6 by PG&E; and 7, 8, 9 by Sempra. These IOU-specific identification code assignments will eliminate duplicate codes, they do not indicate or imply project leadership or initiation.

UUUU is a four letter IOU code. Legend as follows:

C*** - Any project SCE executed alone or collaborated on with other utilities

*G** - Any project PG&E executed alone or collaborated on with other utilities

**M* - Any project Sempra executed alone or collaborated on with other utilities

Unused "*" slots should be replaced by an "x"

Example: "CxMx" would indicate a collaboration between SCE and Sempra. The fourth character is included for potential non-IOU tracking in the database, if ever desired.

FF is a code for type of fuel. First letter is for baseline, second letter is for measure. Use "E" for electric, "G" for gas, "S" for solar, "W" for wind, "O" for other, "R" for other renewable.

The 24 T's represent a project technology / subject descriptor using up to 24 alpha-numeric characters.

10

Workforce Education & Training

1. **Program Name:** Workforce Education & Training
Program ID: SCE-SW-010
Program Type: Core

2. **Projected Program Budget Table**
Table 1¹

SCE-SW-010	Main Program Name / Sub-Program	Total Administrative Cost (Actual)	Total Marketing & Outreach (Actual)	Total Direct Implementation (Actual)	Integration Budget Allocated to other Programs (If Applicable)	Total Budget By Program (Actual)
	CROSSCUTTING					
	SW Workforce Education & Training					
	WE&T Centergies	\$ 10,606,006	\$ 6,366,000	\$ 9,361,994		\$ 26,334,000
	WE&T Connections	\$ 1,330,276	\$ 120,000	\$ 7,605,724		\$ 9,056,000
	WE&T Planning	\$ 1,054,000	\$ 25,000	\$ 2,400,000		\$ 3,479,000
	TOTAL:	\$ 12,990,282	\$ 6,511,000	\$ 19,367,718	\$.	\$ 38,869,000

3. **Projected Program Gross Impacts Table – by calendar year**

Workforce Education & Training (WE&T) is deemed a non-resource program and thus is not expected to provide energy savings to the Investor Owned Utility (IOU) Energy Efficiency portfolio for the 2009-2011 program cycle. However, as part of the on-going efforts of the IOUs and recommendations taken from future study results, the IOU WE&T programs are continually seeking methodologies that can support energy savings contributions for WE&T activities.

Table 2

SCE-SW-010	SW Workforce Education & Training	2009-11 EE Program Gross kWh Savings	2009-11 EE Program Gross kW Savings	2009-11 EE Program Gross Therm Savings
	WE&T Centergies	-	-	-
	WE&T Connections	4,504,564	790	-
	WE&T Planning	-	-	-
	TOTAL	4,504,564	790	-

¹ Definition of Table 1 Column Headings:

Total Administrative Cost includes all Managerial and Clerical Labor, Human Resource Support and Development, Travel and Conference Fees, and General and Administrative Overhead (labor and materials).

Total Direct Implementation – includes all financial incentives used to promote participation in a program and the cost of all direct labor, installation and service labor, hardware and materials, and rebate processing and inspection used to promote participation in a program.

Total Marketing & Outreach includes all media buy costs and labor associated with marketing production.

Integrated Budget Allocated to Other Programs includes budget utilized to coordinate with other EE, DR, or DG programs.

Total Budget is the sum of all other columns presented here

Definition of Sub-Program: A “sub-program” of a program has a specific title, targets, budget, uses a unique delivery or marketing approach not used across the entire program, and for resource programs, has specific estimated savings and demand impacts.

Workforce Education & Training

4. Program Description

a) Describe program

The Statewide IOU WE&T Program represents a portfolio of education, training and workforce development planning and implementation funded by or coordinated with the investor-owned utilities (IOUs): Pacific Gas & Electric (PG&E), Southern California Edison (SCE), San Diego Gas & Electric (SDG&E), and Southern California Gas (SCG). Education and training is a vital component to each of the IOU energy efficiency portfolio filings for 2009-2011 and integral in supporting the achievement of the IOUs' energy savings targets, and the workforce objectives set forth in the California Long Term Energy Efficiency Strategic Plan (Strategic Plan). Workforce Education & Training has become an important crosscutting activity for the IOUs in an effort to not only educate and train current workers, but to prepare future workers to successfully perform the jobs needed to help achieve the aggressive near- and long-term and energy savings targets planned for by the IOUs and California's clean energy goals.

WE&T relies on statewide coordination to collaboratively create a comprehensive training platform that focuses on integrating existing workforce skills with new workforce needs, as well as expand outreach efforts to increase awareness and demand for green careers. This platform will leverage the potential of key stakeholders with the resources, knowledge and commitments necessary to implement such education and training strategy.

California desires to expeditiously increase statewide workforce development and training relying on strategically coordinated planning and administration to deliver energy efficiency and demand side energy management in the public and private sectors. This effort will require concerted planning among secondary and post-secondary educational leaders, technical and professional organizations, state agencies, economic and labor development organizations, utilities, and construction and manufacturing businesses that deliver energy management and efficiency solutions.

The Strategic Plan vision for WE&T is that: “[b]y 2020, California’s workforce will be trained and engaged to provide the human capital necessary to achieve California’s economic energy efficiency and demand side management potential.”² To do this, the Statewide IOU WE&T Program must be constructed in an implementable form to: 1) initiate and drive long-term WE&T development and strategic planning, including identification of funding streams and market sector specific needs; 2) support community college and adult education efforts to develop education based on visible career paths in energy efficiency and related fields; 3) incorporate energy efficiency and integrated demand side energy management into traditional contractor and technician training; 4) support creation or expansion of energy management and efficiency focused curriculum within college and university programs and foster of this knowledge in clear view of students and faculty; 5) support development of K-12

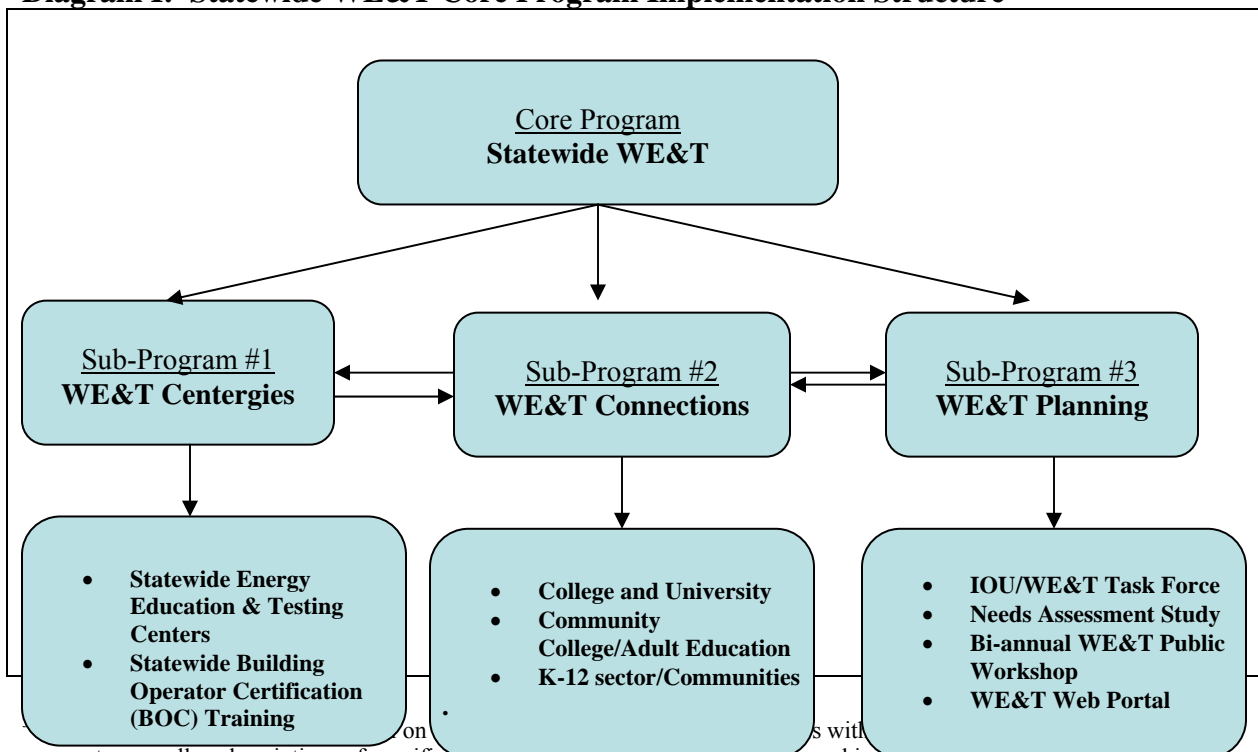
² California Long Term Energy Efficiency Strategic Plan, September 2008, p. 75

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curriculum to include a basic understanding of energy fundamentals, including environmental and greenhouse gas impacts as well as solutions to mitigate energy use impact such as energy efficiency, demand side energy management, and behavioral changes. Another curriculum component would be to identify how career education in energy-related fields can be incorporated across the grades, bolster high school career counseling to improve community college enrollment in green job training programs; and 6) achieve the fullest participation by minority, low income and disadvantaged communities in training and education at all levels of DSM and the energy/resource efficiency industry. Diagram I illustrates the proposed program implementation structure for the Statewide IOU WE&T Program to best deliver the strategies outlined by the Strategic Plan.

Throughout the approved IOU program implementation period, the WE&T Program will strive to facilitate ongoing dialogue with a broad group of market and education sector stakeholders to define, introduce and drive long-term WE&T development. The collaborative goal will be to establish energy efficiency and demand side management education and training at all levels of California's educational system and accommodate the dramatic increase in energy efficiency activities envisioned by the Strategic Plan. The Statewide IOU WE&T program includes three pivotal sub-programs that form an integrated and cohesive structure for implementing WE&T curriculum and related activities in support of IOU energy savings targets and the long-term strategic goals for the state of California as prioritized and outlined by the Strategic Plan and Big Bold Energy Efficiency Strategies (BBEES). There are three sub-programs depicted in the following diagram and further described below.

Diagram I: Statewide WE&T Core Program Implementation Structure³



WE&T Centergies

The **WE&T Centergies** sub-program is generally organized around market sectors and cross-cutting segments to facilitate workforce education and training appropriate to achieve the energy savings, demand reductions and related energy initiatives required of the IOUs. Energy Centers represent the largest component of this sub-program group, and have many years of experience in creating and disseminating high-quality programs, and providing WE&T curriculum and related deliverables – training courses, seminars, workshops, clean energy technology demonstration, equipment efficiency testing, interactive training exhibits and lectures – to promote industry trends and developments for advancing energy efficiency as a professional discipline. Statewide Energy Education and Testing Centers (Centers) are located in the IOU's service territories. For many years, they have served as the IOU's primary delivery channels for mid-stream/up-stream workforce education and training, information dissemination, and education/outreach coordination. IOU administered third-party, partnerships, local government and emerging technology programs, codes and standards, HVAC, low income (LIEE), as well as other community-based training efforts are supported by the Centers to sponsor workforce training courses (**Refer to WE&T Centergies sub-program for more detail**).

The Statewide Building Operator Certification (BOC) Training Program, the second component of this sub-program will continue to play a major role in improving and maintaining California's energy efficient, or green collar, workforce by building the workforce stock of building engineers, stationary engineers, maintenance supervisors, maintenance workers, facility coordinators, HVAC technicians, electricians, and others in the facility operation and maintenance field. The IOUs have been collaborating with BOC to California by offering building operators competency-based training and certification, resulting in improved job skills and more comfortable, efficient facilities. Operators earn certification by attending training and completing project assignments in their facilities. Training topics include facility electrical, HVAC and lighting systems, indoor air quality, environmental health and safety, and energy conservation. The IOUs will work with BOC to shape and realign the BOC certification program to be consistent with the Strategic Plan.

WE&T Connections

The **WE&T Connections** statewide sub-program is organized around downstream and upstream IOU relationships with the educational sector, entry and intro-level community-based training efforts that support workforce development in energy efficiency, energy management and new emerging green careers. This sub-program focuses emphasis on education curriculum and related activities that inspire interest in energy careers, new and emerging technology, as well as future skills development to advance the energy initiatives and goals of the state. This sub-program involves expanded relationship building to foster curriculum development and related training to meet existing and expanding industry needs. IOUs will work with education institutions, labor and communities to nurture interest in green careers by K-12,

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community college, occupational, vocational, and major university students, as well as assist in growth of low-income and transitional workforce-targeted clean energy training programs (**Refer to WE&T Connections Sub-Program for more detail discussion**).

WE&T Planning

The **WE&T Planning** sub-program involves management and execution of several strategic, statewide planning tasks and resulting project implementation actions initiated by the Strategic Plan. The tasks and projects are seen as instrumental in delivering mechanisms and protocols that facilitate ongoing momentum and focus on the achievement of workforce, education and training long-term goals. The WE&T Planning sub-program facilitates implementation and completion of the four key strategic tasks identified in the Strategic Plan to drive long-term WE&T development:

- Form an IOU/CPUC WE&T Task Force;
- Conduct a Needs Assessment;
- Create a WE&T Specific Web Portal; and
- Facilitate bi-Annual WE&T Public Workshops.

(Refer to WE&T Planning sub-program for more detail).

b) List measures

Refer to WE&T sub-programs for specific details.

WE&T Centergies

Statewide Energy Education and Testing Centers (Centers)

The Centers will continue to offer and expand their curricula to their current and to new audiences that make up California’s energy efficiency workforce. The primary target audience for the Centers and that audience’s significance to California’s energy efficiency future is in the WE&T database (see Appendix 1). The WE&T database also includes a more comprehensive list of existing and new educational seminars that the Centers will offer at the local and statewide level. The list reflects classes that are developed around specific technologies or installation methods as well as classes that present integration among DSM programs, including distributed generation and demand response. NOTE: The course topics listed in WE&T database will be modified during the program cycle, as new technologies are introduced into the marketplace and changes to codes and standards are implemented.

Statewide Building Operator Certification (BOC) Training Partnership

BOC will continue to be a workforce education and training partner with the IOUs. The IOUs will expand and improve the BOC partnership. The “measures” to be provided in the BOC program include delivery of the Level I (7-class series) and Level II (4-class series) certification courses listed below. BOC will also track certification statistics.

	2009-2011	2009	2010	2011
Course Series	Total Level 1/Level 2*			

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SCE	23 16/7	7 5/2	8 6/2	8 5/3
PG&E	23 16/7	7 5/2	8 6/2	8 5/3
SoCalGas	5 4/1	1 1/0	2 2/0	2 1/1
SDG&E	9 7/2	3 3/0	3 2/1	3 2/1

*Numbers do not reflect shared BOC sessions (promotion/costs) planned with SCE.

WE&T Connections

College and University sector:

The IOU funded programs that operate at UC/CSU campuses offer the following to advance the strategic plan goals:

- Work with the UC Office of the President of Academic Affairs and the CSU Office of Degree Programs and Educational Opportunities to 1) promote energy minor or major degree programs, 2) collaborate and/or provide expertise in the development of complementary new and revised courses that will form a comprehensive integrated approach to energy education, and 3) consult with campus-specific administrators to define additional courses needed to meet the growing need for graduates with skills in energy efficiency and related fields.
- Student interns work with many campus groups and organizations to promote energy efficiency and green careers to the student body.
- Student interns will work with campus EOP Programs to ensure that minority, low income and disadvantaged students are fully engaged in energy efficiency and green career path programs. Many students do not apply for admission to college because no one in their family has ever attended college or because college seems too expensive. EOP aims to improve the access, retention and graduation of students who have been historically disadvantaged, either socially or economically.
- Student Interns promote energy efficiency throughout the campus by performing energy assessments and providing recommended actions to operate more efficiently.
- Pathway to green jobs through professional development, training, mentoring, integrated academic curricula, internships, project based learning, and a broad-based professional network.
- Students are offered job shadowing and internships with IOUs, Universities, other entities or government agencies.

Community College sector:

The Community College program will better position California's workforce to meet the growing need for energy professionals as well as advance the strategic plan goals:

- The California Community College training and education program currently provides energy efficiency courses for its facilities, and operations and maintenance staff to create an energy efficient environment, help develop energy efficient policies, take advantage of DSM programs and implement distributed generation programs.

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- IOUs are in the early stages of discussion with the Community Colleges in the development of a Utility Workforce Education & Training collaborative. The first step is to gather labor market information from employers in the energy sector and, use the labor market information to develop new certificate and degree programs that focus on energy efficiency and demand side management.
- IOUs will work with campus EOP Programs to ensure that minority, low income and disadvantaged students are fully engaged in our energy efficiency and green career path programs. Traditionally, minority, low income and disadvantaged students heavily favor community Colleges because it is economically more feasible as well as because either their GPA or standardized test scores were not high enough to get into a university. EOP provides support and helps students transition to universities if that is the goal of the student. EOP aims to improve the access, retention and graduation of students who have been historically disadvantaged, either socially or economically.

K-12 sector:

The various K-12 educational components offer the following as well as advance the Strategic Plan:

- Ensure that minority, low income and disadvantaged communities fully participate in training and education programs.
- Designed to promote green careers to K-12 students through energy, environmental curriculum and highlight green careers/jobs. Students will learn about and prepare for green jobs through classroom instruction, experimental learning, and exposure to professionals in the field.
- Designed to educate students on energy, water, renewable energy, demand response, distributed generation as well as green house gases and impact to the environment, with the goal of influencing day-to-day decisions of students and their households (customer awareness focused).
- Designed to educate schools on the benefits of implementing energy efficiency policies and demand response programs at their sites to impact energy use in schools (customer awareness focused).
- The IOUs and/or our third party vendors will work with State Department of Education (Curriculum Commission) as well as County Department of Education to be included in curriculum development advisory boards to help tailor K-12 curriculum to include the science of energy, energy efficiency and discussion about green careers.

c) List of non-incentive customer services

Refer to WE&T Centergies sub-program for specific detail.

i. WE&T Centergies

The common Center elements include:

- Educational seminars;
- Technical consultations;
- Outreach efforts;
- Food Service Test Protocols;

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- Tool Lending Libraries;
- Educational Partnerships;
- Support and collaboration with HVAC industry; and
- Energy Design Resources integration and collaboration.

These non-incentive customer services will be used to direct the Centers' customers to the IOU's incentive programs through inclusion of program materials in class course books, through information integration on Centers' class websites, and literature displays in Centers' exhibits.

5. Program Rationale and Expected Outcome

a) Quantitative Baseline and Market Transformation Information

Market Transformation (MT) metrics proposed in Tables 3 and 4 are preliminary. The proposed metrics are meant to initiate a collaborative effort to elaborate meaningful metrics that will provide overall indicators of how markets as a whole are evolving. MT metrics should neither be used for short-term analyses nor for specific program analyses; rather, should focus on broad market segments.

Market transformation is embraced as an ideal end state resulting from the collective efforts of the energy efficiency field, but differing understandings of both the MT process and the successful end state have not yet converged. The CPUC defines the end state of MT as "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 further publicly-funded intervention is no longer appropriate in that specific market."⁴ The Strategic Plan recognizes that process of transformation is harder to define than its end state, and that new programs are needed to support the continuous transformation of markets around successive generations of new technologies⁵.

Market transformation programs differ from resource acquisition programs on 1) objectives, 2) geographical and 3) temporal dimensions, 4) baselines, 5) performance metrics, 6) program delivery mechanisms, 7) target populations, 8) attribution of causal relationships, and 9) market structures⁶. Markets are social institutions⁷, and transformation requires the coordinated effort of many stakeholders at the national level, directed to not immediate energy savings but rather to intermediary steps such as changing behavior, attitudes, and market supply chains⁸ as well as changes to codes and standards. Resource acquisition programs rely upon the use of financial

⁴ California Public Utilities Commission Decision, D.98-04-063, Appendix A.

⁵ California Public Utilities Commission (2008) *California Long Term Energy Efficiency Strategic Plan*, p. 5. Available at <http://www.californiaenergyefficiency.com/docs/EEStrategicPlan.pdf>

⁶ Peloza, J., and York, D. (1999). "Market Transformation: A Guide for Program Developers." Energy Center of Wisconsin. Available at: <http://www.ecw.org/ecwresults/189-1.pdf>

⁷ Blumstein, C., Goldstone, S., & Lutzenhiser, L. (2001) "From technology transfer to market transformation". Proceedings of the European Council for an Energy Efficient Economy Summer Study. Available at http://www.eceee.org/conference_proceedings/eceee/2001/Panel_2/p2_7/Paper/

⁸ Sebold, F. D., Fields, A., Skumatz, L., Feldman, S., Goldberg, M., Keating, K., Peters, J. (2001) *A Framework for Planning and Assessing Publicly Funded Energy Efficiency*. p. 6-4. Available at www.calmac.org.

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incentives, but concerns have been raised that these incentives distort true market price signals and may directly counter market transformation progress⁹. According to York¹⁰, “Market transformation is not likely to be achieved without significant, permanent increases in energy prices. From an economic perspective, there are 3 ways to achieve market transformation: (1) fundamental changes in behavior, (2) provide proper price signals, and (3) permanent subsidy.”

The question of what constitutes successful transformation is controversial because of a Catch-22: Market transformation is deemed successful when the changed market is self-sustaining, but that determination cannot be made until after program interventions are ended. Often, however, the need for immediate energy and demand savings or immediate carbon-emissions reductions will mean that program interventions may need to continue, which would interfere with the evaluation of whether MT is self-sustaining. Market transformation success has also been defined in terms of higher sales of efficient measures than would have otherwise occurred against a baseline absent of program interventions. The real world, however, provides no such control condition. Evaluators must estimate these baselines from quantitative factors such as past market sales that may be sparse and/or inaccurate - particularly for new products. Evaluations must also defer to expert judgments on what these baselines may have been as well as on the degree of successful market transformation¹¹. Due to the subjective nature of these judgments, it is imperative that baselines as well as milestone MT targets be determined and agreed upon through collaborative discussion by all stakeholders, and these targets may need periodic revision as deemed necessary by changing context.

Market transformation draws heavily upon diffusion of innovation theory¹², with the state of a market usually characterized by adoption rate plotted against time on the well-known S-shaped diffusion curve. In practice, however, the diffusion curve of products may span decades¹³. Market share tracking studies conducted 3, 5 or even 10 years after the start of an MT program may reveal only small market transformation effects¹⁴. The ability to make causal connections between these market transformation effects and any particular program’s activities fades with time, as markets continually change and other influences come into play.

These challenges mentioned above are in reference to programs that were specifically designed to achieve market transformation; and these challenges are only

⁹ Gibbs, M., and Townsend, J. (2000). The Role of Rebates in Market Transformation: Friend or Foe. In *Proceedings from 2000 Summer Study on Energy Efficiency in Buildings*.

¹⁰ York, D., (1999). “A Discussion and Critique of Market Transformation”, Energy Center of Wisconsin. Available at <http://www.ecw.org/ecwresults/186-1.pdf>.

¹¹ Nadel, S., Thorne, J., Sachs, H., Prindle, B., and Elliot, R.N. (2003). “Market Transformation: Substantial Progress from a Decade of Work.” American Council for an Energy-Efficient Economy, Report Number A036. Available at: <http://www.aceee.org/pubs/a036full.pdf>

¹² Rogers (1995) *Diffusion of Innovations*, 5th Ed.

¹³ Example in bottom chart of this graphic from the New York Times: <http://www.nytimes.com/imagepages/2008/02/10/opinion/10op.graphic.ready.html>

¹⁴ Sebold et al (2001) p. 6-5,

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compounded for programs that were primarily designed to achieve energy and demand savings. However, since the inception of market transformation programs almost two decades ago, many lessons have been learned about what the characteristics of successful MT programs are. First and foremost, they need to be designed specifically to address market transformation. “The main reason that (most) programs do not accomplish lasting market effects is because they are not designed specifically to address this goal (often because of regulatory policy directions given to program designers.)¹⁵” The Strategic Plan recognizes that regulatory policies are not yet in place to support the success of market transformation efforts¹⁶, but also reflects the CPUC’s directive to design energy efficiency programs that can lay the groundwork for either market transformation success or for codes and standards changes.

Above all else, the hallmark of a successful market transformation program is in the coordination of efforts across many stakeholders. The most successful MT programs have involved multiple organizations, providing overlapping market interventions¹⁷. The Strategic Plan calls for coordination and collaboration throughout, and in that spirit the utilities look forward to working with the CPUC and all stakeholders to help achieve market transformation while meeting all the immediate energy, demand, and environmental needs. Drawing upon lessons learned from past MT efforts, the Energy Center of Wisconsin’s guide for MT program developers¹⁸ suggests that the first step is not to set end-point definitions, progress metrics or goals. Rather, the first steps include forming a collaborative of key participants. As the Strategic Plan suggests, these may include municipal utilities, local governments, industry and business leaders, and consumers. Then, with the collective expertise of the collaborative, we can define markets, characterize markets, measure baselines with better access to historical data, and define objectives, design strategies and tactics, implement and then evaluate programs. The collaborative will also provide insights that will set our collective expectations for the size of market effects we can expect, relative to the amount of resources we can devote to MT. No one organization in the collaborative will have all the requisite information and expertise for this huge effort. This truly needs to be a collaborative approach from the start.

The metrics and baselines described below in Tables 3 and 4 are presented for the purposes of starting the much-needed discussion between all key participants. These are suggestions, intended to allow key participants to pilot-test processes for establishing baseline metrics, tracking market transformation progress, and for refining evaluation tools. Early trial of these evaluation metrics will reveal any gaps in data tracking so that we may refine our processes before full-scale market transformation evaluations take place.

¹⁵ Peters, J.S., Mast, B., Ignelzi, P., Megdal, L.M. (1998). *Market Effects Summary Study Final Report: Volume 1.* Available at <http://calmac.org/publications/19981215CAD0001ME.PDF>.

¹⁶ CPUC (2008) Strategic Plan, p. 5.

¹⁷ Nadel, Thorne, Saches, Prindle & Elliot (2003).

¹⁸ Peloza & York, (1999).

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The set of metrics we selected is intentionally a small set, for several reasons. First, as mentioned, the full set of metrics and baselines need to be selected by key participants. Second, we anticipate that market share data for many mid- and low-impact measures will be too sparse to show MT effects and not cost-effective to analyze. Third, we selected core measures and metrics that would both be indicative of overall portfolio efforts. These measures are also likely to be offered on a broad level by other utilities, providing a greater base of sales and customer data that could be analyzed for far-reaching MT effects.

The IOUs are proposing a metric that is believed to reliably indicate a trend toward market transformation for energy efficiency workforce education and training. While all metrics fall short of a perfect measure, the ideal metric would have a baseline that is already established that includes a reasonable and easy method of duplication and comparison. Market transformation cannot be measured on a year to year basis but will take several years and measurements to reliably discern trends. With this in mind, the IOUs propose the following metric:

- The ratio of post-secondary education institutions that offer a certification program related to energy efficiency.

Baseline metrics and future targets could be determined through a representative sampling of the all of all post-secondary educational institutions in California. The overarching purpose for this metric is to estimate the expansion certification programs in California.

Table 3

	Baseline Metric
	Metric A
All WE&T efforts	Ratio of post-secondary institutions that offer energy efficiency-related certification programs versus all representative schools

b) Market Transformation Information

As stated above, market transformation draws heavily upon diffusion of innovation theory, with the state of a market characterized by adoption rate plotted against time on the well-known S-shaped diffusion curve. In practice, however, the diffusion curve of products may span decades. Market share tracking studies conducted 3, 5 or even 10 years after the start of an MT program may reveal only small market transformation effects. Therefore it is problematic, if not impractical, to offer internal annual milestones towards market transformation sectors and specific program activities.

As a consequence, it is not appropriate to offer more than broad and general projections. Any targets provided in the following table are nothing more than best guesstimates, and are subject to the effects of many factors and market forces outside the control of program implementers.

Table 4

	Internal Market Transformation Planning Estimates		
	2009	2010	2011
Ratio of post-secondary institutions that offer energy efficiency-related certification programs versus all representative schools	Improvement over baseline, over time	Improvement over baseline, over time	Improvement over baseline, over time

c) Program Design to Overcome Barriers

The Statewide IOU WE&T Program structure is intended to address several new and recent challenges and existing barriers in order to implement a sustainable long-term education and training strategy, while leveraging the resources of the IOUs to help influence energy efficiency curriculum and training content among education, labor and community sectors in a way that incorporates best practices and coordinates investment throughout the state.

The national, statewide and local economic downturn poses a real barrier to change, creating the risk of distracted focus and resistance to invest in projects. The IOUs currently represent a long and stable commitment to energy efficiency and demand-side management education and training. The IOUs have demonstrated the ability to offer a targeted breadth of education and training, but market transformation toward a new green workforce will require an urgent commitment to change by educational sector stakeholders.

The challenge of introducing new technology into the marketplace has historically relied on coordination between technology development, research and technology commercialization. IOUs have demonstrated flexibility in identifying new and emerging technology training needs and introducing workforce training courses to both private and public sectors. However, market transformation to meet target dates associated with net zero new construction and code adoptions will require a rebound in the economy and interest in new investment.

The IOUs offer a broad statewide contiguous view on workforce, education and training which few other parties have. The proposed implementation plan leverages the statewide IOU assets and resources to the extent possible to address gaps in the workforce landscape, wherein IOUs can act as conduits to identify new or successful local and regional workforce training models that can be migrated across the state into underserved areas via IOU implementation, or IOU administration of third-party sponsored implementation. Such an effort cannot occur solely from IOU funding, so there will need to be additional financial stimulus from alternative resources.

WE&T Connections

Energy education is critical to assuring a stable and reliable supply of electricity in California. Educating students will create a new generation of Californians who understand the significance of energy in their lives, their role in its efficient use and the importance of managing our limited resources for the future. This knowledge and information can also lead to life-long energy savings habits and a concern for the environment and its limited resources for not only the students, but for their family and friends. This knowledge and education can also lead to interest in a future green career path. However, given the budget cuts at schools, cuts to curriculum and longer work hours for teachers, getting this message across may not be possible without the assistance of these IOU sponsored programs.

WE&T Connections program components are designed to be both flexible and effective across diverse learning environments. All program components promote the science of energy, energy efficiency, demand response, distributed generation, and empower K-12 and college students to become advocates of smart energy management in their homes, schools, and communities.

The program will address lost opportunities in the schools market by implementing a comprehensive, innovative approach that involves incorporating:

- Some of the nation's leading energy education programs. These programs are 1) designed to promote green careers through energy and environmental curriculum, 2) designed to educate students on energy, water, renewable energy, demand response, distributed generation as well as green house gases and impact to the environment, with the goal of influencing day-to-day decisions of students and their households, and 3) designed to educate schools/facilities on the benefits of implementing energy efficiency policies and demand response programs at their sites so as to impact energy use in schools and universities and to project energy and environmental leadership by example.
- Collaboration with natural gas, electricity and water agencies to promote and encourage the adoption of energy efficiency, demand response, distributed generation and water conservation options.
- Collaboration and integration with residential and business incentive programs that result in firm energy savings for homes and schools.

The WE&T Connections program will address the needs of schools through a combination of student, teacher and school administrator education programs and increase their awareness and knowledge as well as provide support in developing curriculum and/or lesson plans that support these objectives. Also, once school-aged children learn about something such as energy efficiency, they often become great advocates for taking that knowledge home and teaching/motivating their parents and siblings to take actions to reduce energy and water consumption. University students

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can conduct valuable research and effectively educate their peers as well as campus administrators about energy efficiency. Benefits include:

- Educational campaigns can result in significant energy savings in campus facilities and dorms by changing behaviors and purchasing decisions.
- Students are effective advocates, able to reach their peers, communities and high-level decision makers in promoting green jobs on campus.
- IOUs will coordinate with the Department of Education Curriculum Frameworks and Instructional Resources Division to discuss how curricula on energy efficiency fundamentals, greenhouse gas (GHG) issues, and global climate change can be included in the Science Framework (PG&E has submitted an application to be on the Science Curriculum Framework and Evaluation Criteria Committee for the revision of Science Framework, adoption in 2012). Additionally, IOUs will coordinate with the Department of Education for inclusion of curricula of green career options in energy-related fields in the Career Technical Education Framework for grades 7-12.
- IOUs will update the “Resource Guide for Teachers” developed by PG&E that provides an annotated listing of sites and curricula for teachers and students covering issues related to energy, energy efficiency and the environment.
- IOUs will coordinate with partners to expand outreach into K-12 schools that have curricula on energy, water, and environmental issues (e.g., California Dept of Education of Energy, Water Districts, California Department of Energy, California Energy Commission, Air Quality Management Districts).
- As an outcome of the collaboration of partners representing curricula mentioned above suggestions on how to integrate career options in energy-related fields will be explored. In the interim the IOU’s will review the existing curriculum programs that they support and work together to see where career options can be incorporated into their curricula.
- The IOUs and our third party vendors will work with the appropriate (as described in program description) K-12, Community College and University agencies responsible for developing curriculum, courses and programs needed to educate students about energy, energy efficiency and prepare them for a green career path.

d) Quantitative Program Targets

Refer to WE&T sub-program sections for specific details

e) Advancing Strategic Plan goals and objectives

The proposed Statewide IOU WE&T program implementation structure, integrating WE&T Planning as a sub-program in parallel with the two other major statewide IOU sub-programs (WE&T Centergies and WE&T Connections) is intended to better integrate long-term planning with WE&T implementation. As stated in the Strategic Plan: “This cross-cutting sector demands a truly statewide coordination effort that integrates energy efficiency training into a wide range of public and private programs. This effort will include the California Department of Education, the Department of Employment Development, industry and labor associations, educational institutions at

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all levels, technical and vocational training organizations, community based nonprofit organizations and the business community.”¹⁹

California today is faced with an unprecedented challenge: The generation of students graduating high school in 2009 will need to stabilize carbon emissions in the 30+ years of their work career. Additionally, this generation will need to develop and train on the next generation of energy technologies. Transforming California’s current building industry into one that exemplifies carbon neutrality by 2020 will require major changes in our existing market infrastructure and business models. This will result in many new jobs and industries.

One of the keys to success for future implementation of energy efficiency technologies is the need to train the next generation workforce in energy-related positions. The Statewide IOU WE&T Program, supported by the strategic activities of the WE&T Planning Sub Program activities, established a connection among statewide implementers for increasing the knowledge and skills of the current generation - from local code officials, energy managers, and HVAC technicians to school teachers - to develop the muscle needed to achieve market transformation. Achieving success in creating a workforce well-educated in energy efficiency matters will require large-scale, ongoing, collaborative education and training efforts to match evolving demands for both the type of jobs and number of workers needed to fully implement the Strategic Plan.

Addressing human capital resource requirements will require collaborative efforts of federal, state and local governments, financial institutions, community-based and non-profit organizations, industry and labor organizations and utilities. These entities present potential funding sources and opportunities for partnerships.

Everyone benefits from energy efficiency education and training opportunities with the ultimate goal of students entering careers in energy efficiency, advancing within their established career paths, and ultimately helping the state to meet very intense energy efficiency goals. A better trained workforce will advance the purpose of DSM implementation, policy, research and development, and education.

The educational components offered by the WE&T Connections program provide energy efficiency education and training at most levels of California’s educational systems. The program also ensures that minority, low income and disadvantaged communities fully participate in training and education programs at all levels of the DSM and energy efficiency industry. The expected results are:

- Students develop careers and existing workers develop skills and knowledge that advance DSM business, policy, research and development and education; and
- Individuals from the targeted communities take advantage of programs that specialize in energy disciplines at all levels of the educational system and

¹⁹ California Long Term Energy Efficiency Strategic Plan, September 2008, p. 75

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successfully advance themselves into rewarding careers in the energy services fields.

The Statewide IOU WE&T Program is structured to implement workforce training and workforce curriculum development in cooperation with the California Community Colleges Chancellor's Office, the California Board of Education and Adult Education Leadership. WE&T Planning Taskforce and bi-annual workshops will help to nurture technical training and education services that support community college and adult education within the first 12 months of the program cycle.

Together, these relationships will be able to outline the foundational learning plan(s) needed to prepare students for career paths in energy efficiency and related fields. Based from experience, learning plan outlined through this collaborative effort could provide students with entry points for entering the field of energy efficiency and/or result in career development tracks within a traditional education system. IOUs would initially suggest learning plans be based on the "working backwards" exercise of asking what knowledge, skills, educational background and abilities are needed for particular sets of jobs and careers.

Once these various attributes have been identified, learning plans shall be developed which will drive the development of curricula and training programs and support the knowledge and skills set needed to prepare students for the "green collar" workforce. The Statewide IOU WE&T Program will build on existing training activities to address "gaps" in the learning plans as appropriate and diagnosed by the needs assessment.

The Statewide IOU WE&T Program is modeled to generate stronger linkages to K-12, advising on energy curriculum and coordination between K-12, Community Colleges Chancellor's Office and the adult education sector. The Statewide IOUs will exchange instruction and curricula with community colleges, industry and labor on HVAC, Energy Audits, Home Performance Retrofits and Building Operator Certification. The Statewide IOU WE&T Program will also advance consistency among the IOUs to use training curricula through established partnerships with the community colleges, vocational / technical / trade schools and apprenticeship programs.

The Statewide IOU WE&T Program establishes a framework for cross-sectional expansion of training curricula and related workforce development programs to address HVAC quality installation and maintenance, building construction, home performance audit and retrofit services, building operator certification, facilities maintenance and other technical fields. The sub-programs will build on the established partnerships with key partners to deliver technical information through a wide variety of training and education services for upstream actors such as contractors, installers, inspectors, plan checkers, designers, architects, engineers, vendors, installers and other technical skilled personnel to increase actions, awareness

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and attitudes toward energy efficiency. (Refer to Statewide HVAC PIP – Program #7).

The Statewide IOU WE&T Program as structured supports the Big / Bold Strategies adopted by the California Public Utilities Commission (Commission) in the *Strategic Plan* by continuing to offer training programs on quality installation and maintenance of HVAC systems and equipment selection based on whole building design, training and certification, compliance improvement and new technologies. Education and Training will continue its focus on the building envelope and overall home performance by providing HVAC quality installation, maintenance and service courses based on Air Conditioning Contractors of America standards. Education and Training will also continue to offer programs on new and emerging technologies in HVAC (e.g., ductless mini-split heat pump systems) and will encourage HVAC participants to become certified under the North American Technician Excellence (NATE) certification program as a means of demonstrating technicians and installers' ability to perform quality work. (Refer to Statewide HVAC PIP – Program #7).

The Statewide IOU WE&T Program will work with Marketing Education and Outreach implementers on effective marketing and outreach strategies that will be designed to maximize participation in green career paths. For example, to increase awareness of the availability of training and career development programs, WE&T will contribute to the Web portal project to ensure that “green education” opportunities are accessible through the Web portal.

During the first 24 months of the program cycle, the Statewide IOU WE&T Program will be a guide for collaboration among the Department of Employment Development, community colleges, technical and vocational schools, industry and labor associations specifically on building job training programs and internships for ready students and preparing them for energy efficiency careers and related career paths. Collaboration will be aided by recruitment of key resources to help in promoting to students and continuing education participants the types of employment prospects available in energy derived from the WE&T Assessment study and other market data.

Within the first 24 months of the program cycle approval, the Statewide IOU WE&T Program structure will demonstrate its effectiveness to drive statewide coordination among key stakeholders to expand continuing education and college extension programs to include a greater focus on energy/resource efficiency, sustainability and green technologies. The Statewide IOU WE&T Program structure clearly shows the intent to collaborate with the UC/CSU system and California's community colleges to bring an expanded focus on energy/resource efficiency to students and faculty; utilize the extension programs available through the colleges and universities to incorporate a continuing education curriculum component; and work with these educational institutions to help them with expansion of their green degree programs. The Statewide IOU WE&T Program will seek ways of increasing awareness of the importance of energy efficiency, sustainability and green technologies to California,

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and the key partners will be able to positively impact participation and enrollment in educational programs and green careers.

The Statewide IOU WE&T Program enhances relationships with K-12 public and private educators to share best practices to attract students and facilitate interest in energy efficiency careers and the study of energy efficiency and GHG emissions.. The WE&T Connections sub-program implementation, in collaboration with WE&T Planning activities, engage industry experts and educational specialists including but not be limited to: the State Department of Education, educators working at County Offices of Education, leaders in teacher organizations [e.g., California Science Teachers Association (CSTA), California Regional Environmental Education Community (CREEC), Regional Occupational Centers and Programs (ROCP), California Integrated Waste Management Board (CIWMB), and the California Environmental Protection Agency for the K-12 market to determine the inventory of educational resources, funding mechanisms, etc., and include a breakdown of workforce development and strategic planning needed to establish career training for energy-related fields.

The California EPA and the California Integrated Waste Management Board (CIWMB) are involved in the implementation of AB1548. This is the development of a “unified education strategy to bring education about the environment into California’s primary and secondary schools.”²⁰

Identified are fourteen specific environmental topics where curriculum is currently being developed. The WE&T will engage in the State Department of Education Science Framework revision to encourage incorporation of energy efficiency and renewable energy emphasis.

The Statewide IOU WE&T Program will help steer more training outreach and green careers education toward minority, low-income and disadvantaged communities. The IOU administered LIEE program is expected to dramatically expand the number of units that will receive education and weatherization services during the 2009-2011 program cycle. To meet the significantly higher goals, more communication and joint WE&T coordination will be necessary and desirable. The Statewide IOU WE&T Program creates an implementation framework to focus on expanding behavior modification in existing training programs to increase emphasis on energy efficient practices, steps that will enable installers, weatherization crews and energy specialists to build on the information they provide to minority, low-income and disadvantaged communities to achieve California’s economic energy efficiency potential.

6. Program Implementation

a) Statewide IOU coordination

As part of the overall Program Implementation Strategy, the statewide IOU WE&T program plans to institute protocols and processes to identify and facilitate statewide

²⁰ See www.calepa.ca.gov/Education/EEI/workgroups/envirotopics.

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migration of quality training models into each IOU service area (refer to subsections 6-g), as well as into underserved communities within the respective IOU service areas, where appropriate.

Summary table of WE&T target sectors, program implementation and implementers:

Workforce Education & Training (target sectors)	Sub-Program [components]	Sub-Program [coordinated] implementation
Schools	Green Campus;	WE&T; IOU UC/CSU/CCC Partnerships
Commercial Market Segments	Tool Lending; Food Service; Building Design Training; Building Operations and Maintenance	WE&T (Energy Centers); Statewide Commercial Resource Programs; IOU Local Government Partnerships; BOMA; BOC; USGBC; New Construction; Codes & Standards
HVAC Industry	ACCA; IHACI - QI/QM/QS (ACCA standards inclusive)	WE&T (Energy Centers) Community Colleges Statewide HVAC Program
Residential Market Segments	Building Design and Construction Training; CLEO (SCG/SDGE)	WE&T (Energy Centers) BIA – Remodelers; Statewide Residential Resource Programs; New Construction; BPI; Low Income Energy Efficiency
Industrial/Agriculture Market Segments	Tool Lending;	WE&T Statewide

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Workforce Education & Training (target sectors)	Sub-Program [components]	Sub-Program [coordinated] implementation
	Audits/Assessments	Residential Resource Programs; DOE; Industrial and Agricultural segments

b) Program delivery and coordination

The following represents three areas of focus for the IOUs to deliver WE&T training curriculum to expanded audiences:

Joint statewide training and seminars – comprehensive energy efficiency and clean energy educational seminars and conferences jointly hosted, promoted and sponsored among the IOUs, municipalities, government agencies, non-profits and industry experts.

Distance learning – web-based platform for synchronous and asynchronous access to digitally transmitted and pre-recorded (catalogued) on-line education and training modules. Distance learning enables webcasting as a communication tool to reach larger workforce audiences with specific training topics in a low cost manner. IOUs can explore co-production and access to on-line training curriculum with other agencies (i.e. CARB, CAL-EPA) to provide more comprehensive energy solutions training.

Outreach – Assist community-based training programs that offer Energy Efficiency and hands-on training green job curriculum to trainees in minority and other disadvantaged communities. These types of relationships will be coordinated with Low-income energy efficiency and likely piloted regionally by IOUs to develop best practices, determine cost effective designs and fine tune a model for turnkey statewide migration. IOUs can help community training programs implement best practices, measure impacts and revise programs, while helping to shape and form standardize integrated resource curriculum (i.e. water, air emissions) beyond what can be offered by IOUs.

i. **Emerging Technologies (ET) program**

The Statewide IOU WE&T Program will collaborate with Emerging Technologies in an improved manner to allow external participation in the ET process. Working closer with ET to increase knowledge and confidence in emerging technologies, the WE&T programs will help with implementation of these new technologies disseminating information and training to enhance market transformation and acceptance into the marketplace.

ii. **Codes & Standards program**

The Statewide IOU WE&T Program structure segregates sub-program curricula to make it easier to identify training opportunities that: 1) enhance interest in C&S

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career positions, 2) provide training on the codification process of energy efficiency and green laws, 3) provide direct industry training on energy and green implementation strategies in response to current or impending codes and standards and 4) prepare the workforce for code compliance improvement tasks.

iii. WE&T efforts

The Statewide IOU WE&T Program will support the other IOU Energy Efficiency Programs as appropriate. Please see Section 6.b.iii for each Sub-Program for additional plans, if applicable.

iv. Program-specific marketing and outreach efforts

Please see sub-programs, if applicable.

v. Non-energy activities of program

Please see sub-programs, if applicable.

vi. Non-IOU programs

The proposed Statewide IOU WE&T Program structure represents a common ground for delivering and coordinating statewide workforce training program among IOU and non-IOU sponsored trainers. WE&T as a strategic platform can help facilitate energy neutral training, coordination and funding among not only IOUs, but other stakeholders linked to California's energy plans.

Please see Section 6.b.vii for each sub-program for additional plans, if applicable.

vii. CEC work on PIER

Please see sub-programs, if applicable.

viii. CEC work on Codes and Standards

Please see sub-programs, if applicable.

ix. Non-utility market incentives

Please see sub-programs, if applicable.

c) Best Practices

In addition to showing the relationship of the Statewide WE&T program and sub-programs, Diagram I also illustrates the bi-directional interaction anticipated between the sub-programs under this structure. This represents IOU commitment to the WE&T strategic plan and its objectives, as well as IOU interests in facilitating stakeholder input in presenting, identifying and supporting IOUs efforts to create well coordinated processes to connect and migrate local and regional WE&T models across the state based on best practices identified by a variety of stakeholders. The WE&T taskforce, with CPUC, IOU and statewide stakeholder roles can have a long-term impact on WE&T implementation plans of IOUs by maximizing the benefits of the structure presented. Regularly scheduled meetings among WE&T taskforce members will ensure that voices can be heard, IOUs implementation plans can be discussed and long-term WE&T strategic progress is addressed. As has been

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described in this section in some length, by layering the strategies outlined in the Strategic Plan on the Statewide IOU WE&T PIP, the IOUs see that as a sustainable framework for achieving the various goals sought by the CPUC from the IOUs.

d) Innovation

Please see sub-programs, if applicable.

e) Integrated/coordinated Demand Side Management

Please see sub-programs, if applicable.

f) Integration across resource types (energy, water, air quality, etc)

Please see sub-programs, if applicable.

g) Pilots

There are a few pilot concepts that are being introduced to the WE&T Sub-Program portfolios. A pilot to the Statewide IOU WE&T Program committee represents a new concept that is being implemented on a limited scale for a duration of at least one year by one or more of the IOUs, and then evaluated using internal metrics and criteria for presentation to the statewide IOU WE&T representatives. Once the statewide IOU WE&T committee agrees that a particular idea or innovation has merit and funding among the IOUs on a statewide basis is deemed sufficient, the IOUs will adopt the pilot for statewide migration, establishing a project plan for integration as a statewide program and implementation across all IOU service areas. Each IOU will track the adopted Sub-Program pilot toward the statewide targets and goals to determine whether the pilot is generating the intended results in the new regions. Refer to WE&T sub-programs for specific detail of planned pilots.

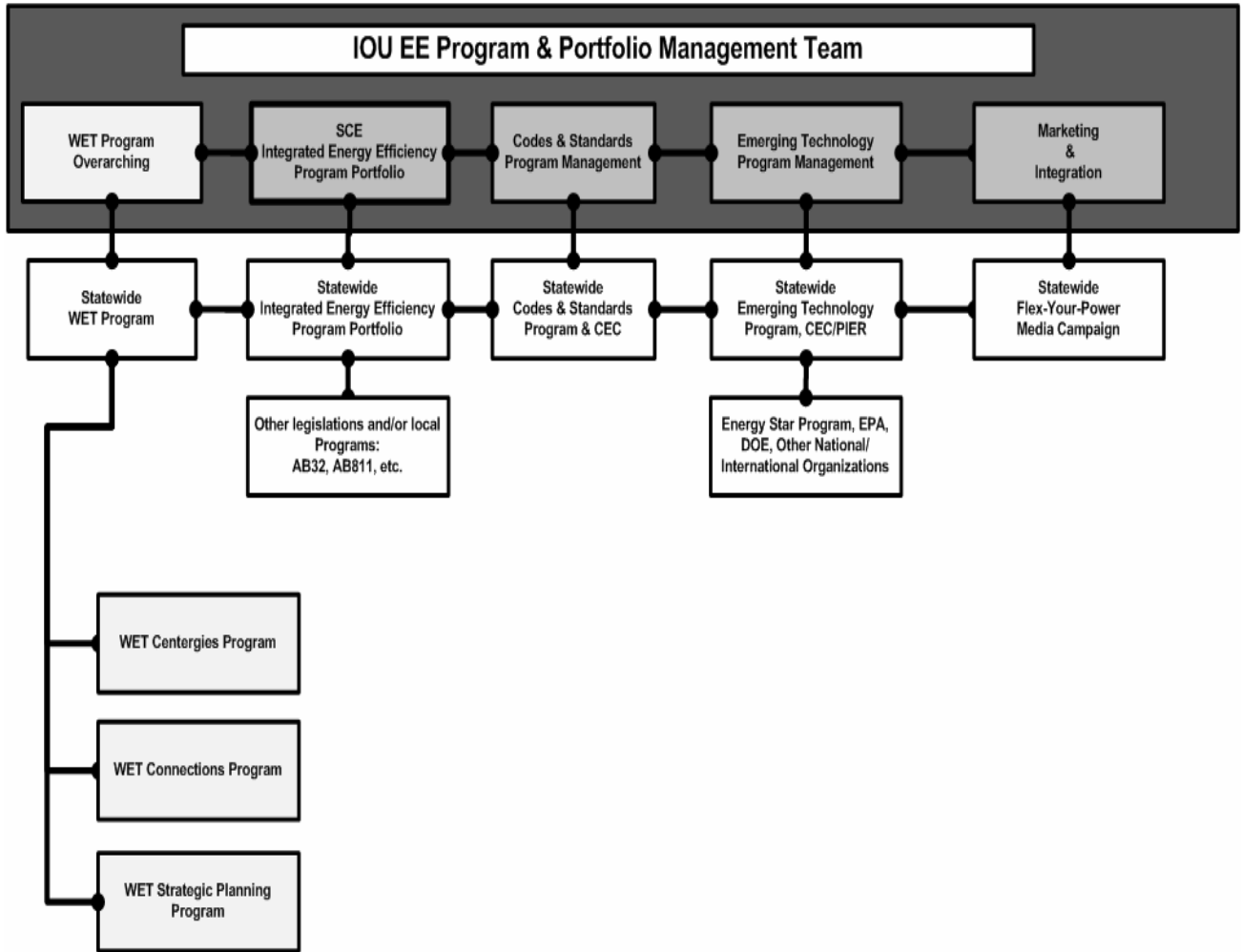
h) EM&V

IOUs have traditionally tracked data by number of courses and attendees as primary metrics for the purposes of progress reporting to the CPUC. IOUs recommend using the existing and familiar quantitative data going-forward as a WE&T baseline metric for measuring market transformation progress and allowing IOUs over time to introduce and integrate other useful metrics to measure long-term implementation impacts of *statewide* WE&T curriculum and related activities.

The utilities are proposing to work with the Energy Division to develop and submit a comprehensive EM&V Plan for 2009-2011, after the PIPs are filed. This will include process evaluations and other program-specific studies within the context of broader utility and Energy Division studies. More detailed plans for process evaluation and other program-specific evaluation efforts cannot be developed until after the final program design is approved by the CPUC, and in many cases, after program implementation has begun, since plans need to be based on identified program design and implementation issues.

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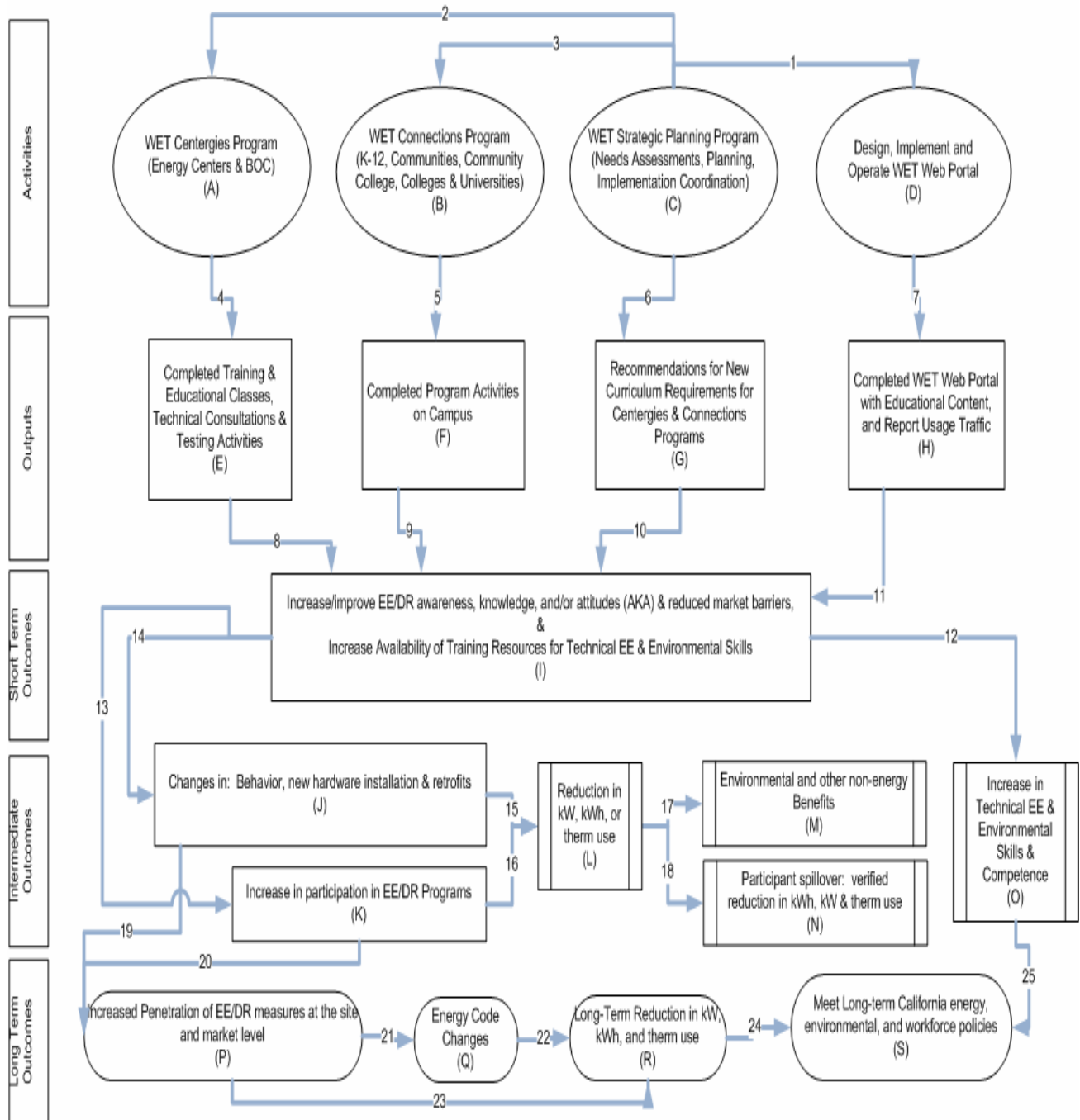
7. Program Diagram



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8. Program Logic Model

PY2009-2011 Workforce Education & Training (Overarching) Program - Logic Model



10a

- 1. Program Name:** WE&T Centergies
Program Type: Core

- 2. Projected Program Budget Table**

Table 1 - reference the WE&T Core PIP for budget details.

- 3. Projected Program Gross Impacts Table – by calendar year**

Table 2 – Non-resource program.

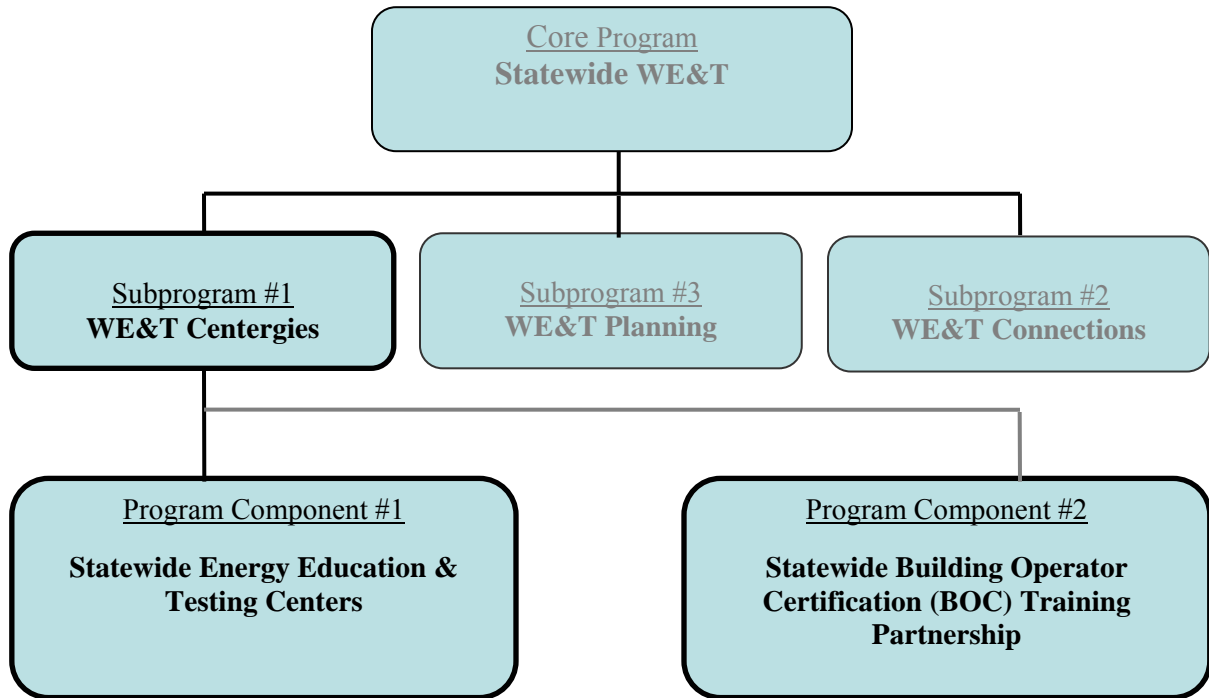
- 4. Program Description**

- a) Describe program**

The **WE&T Centergies** sub-program is generally organized around market sectors and cross-cutting segments to facilitate workforce education and training appropriate to achieve the energy savings, demand reductions and related energy initiatives required of the IOUs.

The Energy Education and Testing Centers (Centers) represent the largest component of this Sub-Program group, have many years of experience in creating and disseminating high-quality programs, and provide WE&T curriculum and related deliverables - training courses, seminars, workshops, clean energy technology demonstration, equipment efficiency testing, interactive training exhibits and lectures to promote industry trends and developments for advancing energy efficiency as a professional discipline. Centers are located in the IOU's service territories. For many years, they have served as the IOU's primary delivery channels for mid-stream/up-stream workforce education and training, information dissemination, and education/outreach coordination. IOU-administered Third-party, Partnership, Local Government and Emerging Technology programs, Codes and Standards, Heating, Ventilation and Air Conditioning (HVAC), Low Income Energy Efficiency (LIEE), as well as other community-based training efforts are supported by the Centers to sponsor workforce training courses.

The Statewide Building Operator Certification (BOC®) Training Partnership, the second component of this sub-program, will continue to play a major role in improving and maintaining California's energy-efficient green collar building workforce stock of building engineers, stationary engineers, maintenance supervisors, maintenance workers, facility coordinators, HVAC technicians, electricians, and others in the facility operation and maintenance field. The IOUs have been collaborating with the BOC to offer California building operators competency-based training and certification, resulting in improved job skills and more comfortable, efficient facilities. Operators earn certification by attending training and completing project assignments in their facilities. Training topics include facility electrical, HVAC and lighting systems, indoor air quality, environmental health and safety, and energy conservation. The IOUs will work with BOC to shape and realign the BOC certification program to be consistent with the Strategic Plan.



b) List measures

WE&T Centergies

Statewide Energy Education and Testing Centers (Centers)

The Centers will continue to offer and expand their curricula to their current and to new audiences that make up California’s energy efficiency workforce. The primary target audience for the Centers and that audience’s significance to California’s energy efficiency future is in the WE&T database. The WE&T database also includes a more comprehensive list of existing and new educational seminars that the Centers will offer at the local and statewide level. The list reflects classes that are developed around specific technologies or installation methods, as well as classes that present integration among DSM programs, including distributed generation and demand response.

Statewide Building Operator Certification (BOC) Training Partnership

BOC will continue to be a WE&T partner with the IOUs. The IOUs will expand and improve the BOC partnership. The “measures” to be provided in the BOC program include delivery of the Level I (7-class series) and Level II (4-class series) certification courses listed below. BOC will also track certification statistics.

Workforce Education & Training: WE&T Centergies

	2009-2011	2009	2010	2011
Course Series	Total Level 1/Level 2*			
SCE	23 16/7	7 5/2	8 6/2	8 5/3
PG&E	23 16/7	7 5/2	8 6/2	8 5/3
SoCalGas	5 4/1	1 1/0	2 2/0	2 1/1
SDG&E	9 7/2	3 3/0	3 2/1	3 2/1

*Numbers do not reflect shared BOC sessions (promotion/costs) planned with SCE.

c) List non-incentive customer services

WE&T Centergies

A table of the Centers’ elements is summarized and defined in section 4-a)i, above.

The common Center elements include:

- Educational seminars;
- Technical consultations;
- Outreach efforts;
- Food Service Test Protocols;
- Tool Lending Libraries;
- Educational Partnerships;
- Support and collaboration with HVAC industry; and
- Energy Design Resources integration and collaboration.

These non-incentive customer services will be used to direct the Centers’ customers to the IOU’s incentive programs through inclusion of program materials in class course books, information integration on Centers’ class websites, and literature displays in Centers’ exhibits.

BOC’s non-incentive customer services are delivered in the form of training series.

5. Program Rationale and Expected Outcome

a) Quantitative Baseline and Market Transformation Information

By its nature, market transformation occurs as a result of numerous factors and programs, not single sub-programs. Therefore, all metrics are proposed at the program level. Please refer to the quantitative baseline and market transformation discussion, presented in the overall program PIP.

Table 3 – Refer to the overarching program for quantitative baseline metrics

b) Market Transformation Information

By its nature, market transformation occurs as a result of numerous factors and programs, not single sub-programs. Therefore, all metrics and goals are proposed at

the program level. Please refer to the quantitative baseline and market transformation discussion, presented in the overall program PIP.

Table 4 – Refer to the overarching program for market transformation metrics

c) Program Design to Overcome Barriers

Statewide Energy Education and Testing Centers (Centers) and Building Operator Certification (BOC)

Through the energy education and testing centers and Building Operator Certification, SCE has been supporting the energy efficiency workforce and partnering with 3rd Parties and Local Governments for approximately 30 years. As disseminators of information, the Centers are structured to deliver integrated energy efficiency, demand response, and renewable energy program information through their offerings described below. The Centers serve as a “public face” and conduit to California’s local and statewide energy efficiency programs. Through this relationship with customers/clients, the Centers are able to overcome many barriers other entities may not.

The national, statewide and local economic downturn poses a real barrier to change, creating the risk of distracted focus and resistance to invest in projects. SCE Centers represent a long and stable commitment to energy efficiency and demand-side management education and training. The Centers have demonstrated the ability to offer a targeted breadth of education and training program, but market transformation toward a new green workforce will require an urgent and commitment to change by educational sector stakeholders. The Centers will look to the educational stakeholders as welcomed allies and resources to train and transform the market.

The challenge of introducing new technologies into the marketplace has historically relied on coordination between technology development, research and technology commercialization. Centers have demonstrated flexibility in identifying new and emerging technology training needs and introducing workforce training courses to both private and public sectors. However, the centers alone will have a major challenge to meet market transformation target dates associated with net zero new construction and code adoptions unless a well coordinated effort is assisted by a successful rebound in the economy generating a renewed interest in energy efficient technology investments.

The BOC and the Centers have and will continue to evolve their elements to overcome other market challenges:

Confusion over what information to believe: The Centers will continue to deliver high-quality integrated educational seminars to train members of the energy efficiency workforce, including entry level contractors, disadvantaged community members, university and community college students, architects, food service designers and operators, HVAC engineers, equipment installers, manufacturers, developers, and commissioning agents. Seminars will be improved to be more

Workforce Education & Training: WE&T Centergies

integrated between topics including distributed generation, demand response, and energy efficiency.

Lacking access to proper training: The BOC and the Centers will provide on- and off-site outreach programs for disseminating technical energy efficiency information and web-based DSM tools, and promoting utility energy efficiency incentive programs to green-, blue- and white-collar building professionals.

The Centers will also offer design, certification, and maintenance of food service equipment test protocols that allow for unbiased measurement of energy efficiency and production capacity to enhance the level of industry professionals.

Lack of access to proper measurement tools: The Centers will expand and integrate tool lending library programs that provide building and system performance measuring instrumentation, instrument use information, and measurement protocols. Tool lending libraries will loans tools free of charge to people working on short-term energy-efficiency projects in California. Tool users will include building operators, facility managers, designers and other professionals who use the tools for building diagnostics, site analysis, power & energy consumption studies, research projects, and educational efforts.

SCE offers a broad contiguous view on workforce education and training which few other parties can match. The proposed implementation plan leverages IOU assets and resources to the extent possible to address gaps in the workforce landscape, and IOUs can act as conduits to identify new or successful local and regional workforce training models that can be migrated across the state into underserved areas via IOU implementation or IOU administration of third-party sponsored implementation. Such an effort cannot occur solely from IOU funding, so a concerted effort will be made to identify and partner with other institutions and association to secure additional financial stimulus.

d) Quantitative Program Targets

The targets provided herein are best estimates, but nonetheless are forecasts.

Table 5

Centergies	Program Target by 2009	Program Target by 2010	Program Target by 2011
SCE Energy Center Seminar and Workshops	178	230	230

BOC	2009-2011	2009	2010	2011
Course Series	Total Level 1/Level 2			
SCE	23 16/7	7 5/2	8 6/2	8 5/3

Workforce Education & Training: WE&T Centergies

PG&E	23 16/7	7 5/2	8 6/2	8 5/3
SoCalGas	5 4/1	1 1/0	2 2/0	2 1/1
SDG&E	9 7/2	3 3/0	3 2/1	3 2/1

*Numbers do not reflect shared BOC sessions (promotion/costs) planned with SCE

e) **Advancing the Strategic Plan goals and objectives**

See core PIP for Strategic Plan linkages.

6. Program Implementation

a) **Statewide IOU Coordination**

i. **Program Name**

SCE’s Energy Centers - (Customer Technology Application Center or CTAC, and Agriculture Technology Application Center or AgTAC).

ii. **Program delivery mechanisms**

Statewide Energy Education and Testing Centers (Centers)

Through their Centers, California’s IOUs have been supporting the energy efficiency workforce and partnering with third party and local government partnerships, in some cases, for over 30 years. As disseminators of information, the Centers are structured to deliver integrated energy efficiency, demand response, and renewable energy program information through their offerings described below. The Centers serve as a “public face” in interactions with the community and as a conduit to California’s local and statewide energy efficiency programs. With some variation at the local level, the Centers have and will continue to evolve their elements to:

- Deliver high-quality integrated educational seminars to train members of the energy efficiency workforce, including entry-level contractors, disadvantaged community members, university and community college students, architects, food service designers and operators, HVAC engineers, equipment installers, manufacturers, developers, and commissioning agents. Based on factors, including changes in technology, changes in codes and standards, and feedback from seminar participants, seminars will be improved to be more integrated among topics, such as distributed generation, demand response, and energy efficiency, as described in subsections 6e and 6f. Seminars will continue to include transferring skills on energy audits to members of the energy efficiency workforce at various stages in their careers—novices to seasoned energy auditors.
- Provide technical consultations and equipment demonstrations through building design plan and equipment schedule reviews, technical advice on new equipment and system technologies, technical advice on best-practice methods, and site visits for identifying energy efficiency opportunities. Site visits shall not replicate the efforts of the energy audits program, but rather be conducted when necessary to provide technical advice.

Workforce Education & Training: WE&T Centergies

- Outreach falls under the local Center, provide on- and off-site outreach programs for disseminating technical energy efficiency information, and promoting utility energy efficiency incentive programs to green- and white-collar building professionals. Outreach programs will include, but not be limited to on-site facility tours, off-site short presentations about Centers' offerings, participation in environmental fairs and events. Centers shall work with their IOU's marketing groups so as to collaborate, but not duplicate efforts.
- Design, certify, and maintain food service equipment test protocols that allow for unbiased measurement of energy efficiency and production capacity while engaging manufacturers and chain operators to test equipment and build performance results directories.
- Expand and integrate tool lending library programs that provide building and system performance measuring instrumentation, instrument use information, and measurement protocols. Tool lending libraries will loans tools free of charge to people working on short-term energy-efficiency projects in California. Patrons will include building operators, facility managers, designers and other professionals who use the tools for building diagnostics, site analysis, power & energy consumption studies, research projects, and educational efforts. Local variation among Centers for expansion or creation of their tool lending libraries is described in an individual Center's PIP.
- Expand energy efficiency educational partnerships with institutions that include government, professional, and trade organizations that will help Centers deliver IOU programs and information to a broader audience. Examples of such groups are the U.S. Green Building Council, Building Owners and Manufacturers Association, American Institute of Architects, American Society of Heating, Refrigerating, and Air-conditioning Engineers, the Association of Energy Engineers, the Illuminating Engineering Society, Institute of Heating and Air Conditioning Industries, Air Conditioning Contractors of America, Affordable Comfort Inc., Building Performance Institute, Residential Energy Services Network, Apprenticeship Training Programs, North American Technician Excellence, the National Restaurant Association, Foodservice Consultants Society International, North American Foodservice Equipment Manufacturers, National Environmental Balancing Bureau, Stationary Engineer Unions, U.S. Environmental Protection Agency / Department of Energy Star, American Society for Testing and Materials, and the California Energy Commission. More detail on educational partnerships is available as part of the Statewide WE&T Connections Subprogram PIP.
- Support building energy efficiency by developing training sessions to prepare the marketplace for new HVAC codes (acceptance testing and HERS verification), technologies, and innovative whole building approaches to new and existing buildings. Since the HVAC Big Bold initiative will expand training and education aimed at the HVAC industry, the WE&T program will coordinate carefully to complement HVAC industry training by providing educational support to related market actors such as energy consultants, Home Energy Raters, Engineers, Architects, and Home Performance Contractors. It

Workforce Education & Training: WE&T Centergies

is anticipated that the robust HVAC industry training proposed by the HVAC program will create important collaboration opportunities to not only increase training opportunities, but to embellish energy center offerings and impacts.

- Increase statewide Energy Design Resources (EDR) Integration. (EDR) is an existing statewide energy efficiency resource website featuring design materials on how to effectively integrate energy efficient designs into nonresidential facilities. EDR has begun developing the structure to expand the materials and tools offerings to include residential design requirements. While EDR is not funded through WE&T, EDR content is very relevant to the Centers' WE&T direction and goals. Centers will integrate EDR content (online classes, case studies, materials, etc) as statewide resources that are relevant to specific classes, outreach efforts, and consultations.

The table below summarizes common Center elements defined above.

Centers' Elements	SCE AGTAC	SCE CTAC	PG&E ETC	PG&E PEC	PG&E FSTC	SDGE SDERC	SCG ERC	SCG FSEC
WE&T Seminars	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Technical Consultations	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Outreach	No**	No**	Yes	Yes	Yes	Yes	Yes	Yes
Food Service Test Protocols.	TBE*	TBE*	N/A	N/A	Yes	TBE*	N/A	Yes
Tool Lending Library	TBE*	TBE*	Yes	Yes	TBE*	Yes	TBE*	TBE*
Educational Partnerships	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*TBE = To be established (based on information collaboration with other Centers)

** Marketing outreach efforts are not part of this Center and occur in other parts of the utility

N/A = Not applicable to Center's primary target audience

Statewide Building Operator Certification (BOC) Training Partnership

Building operators are a sector of California's green collar workforce that will continue to play a major role in improving and maintaining California's energy efficient building stock.

Buildings at all scales—small commercial to high-rise commercial and universities—that are designed to operate at a high level of energy efficiency and comfort often fall short of design expectations for many reasons, including unexpected occupancy or use patterns, malfunctioning controls, incorrect installation, and equipment that falls out of calibration over time. Building operators and facility managers play major roles in ensuring that buildings are performing at the level of efficiency and comfort they were designed to perform.

BOC is a national program providing education and accreditation in the field of energy efficiency of commercial and institutional buildings. BOC has been recognized by the American Council for an Energy Efficient Economy as one of the country's "Exemplary Programs." With more than 6,000 facility professionals earning the credential, BOC is widely recognized by key employers as a means to distinguish skill proficiency for energy management in buildings.

As an active national training program, BOC is well positioned to provide training for workers looking to establish or enhance their building energy efficiency skill sets as well as those who may need foundational building and energy efficiency training as an entry point to a growing clean energy workforce. BOC's target workforce audience includes building engineers, stationary engineers, maintenance supervisors, maintenance workers, facility coordinators, HVAC technicians, electricians, operations supervisors, operations technicians, and others in the facility operation and maintenance field.

The BOC curriculum supports a credential at two levels. The Level I certification provides a strong grounding in commercial building systems, the key energy using equipment within the building, and how improved energy management technology and practices can reduce operating costs, improve comfort and productivity, and reduce the building's carbon footprint. The Level II certification builds on those competencies with additional technical specificity in key building energy use areas such as HVAC, controls, and electrical equipment. In total, the BOC curriculum offers a comprehensive 130 hours of training. A list of class topics for Level I and II are provided in the Appendix 1.

BOC Beyond the Classroom

BOC offers a classroom training component supplemented by both an exam process for credentialing as well as a practicum component. Participants utilize a set of project assignments which help ensure that energy management principles are well understood and can be actively applied in buildings. The program has had numerous third party evaluations over the past 10 years and has been rated very positively by participants and their employers. These evaluations have consistently reported significant energy savings for employers who utilize credentialed BOC employees. Utilities across the country are supporting BOC and many utilize the core training program as a means for professional development of their internal staff.

Employers and BOC

BOC is being used by employers across the country for their energy management training needs. Public agencies, private employers, property managers, schools, universities, and healthcare institutions are all active BOC participants. Many companies and public institutions use BOC as a component of their professional development track for their employees. Examples of employers using BOC include California State University System, Irvine Company, Providence Health

System, Raytheon, State Farm Insurance, and Washington State General Administration.

IOUs and BOC

The IOUs have been collaborating with BOC to offer California building operators competency-based training and certification, resulting in improved job skills and more comfortable, efficient facilities. Through a coordinated effort, the four California IOUs offer BOC training to their commercial and institutional customers. The statewide program combines classroom training, exams and in-facility project assignments to train and certify building engineers and O&M technicians in the practice of energy efficient building operation and maintenance. NEEC has implemented the program for the IOUs since 2002. SCG and SCE will work closely on cross-fuel training opportunities.

The IOUs will work with BOC to shape and realign the BOC certification program to be consistent with the Strategic Plan. Changes to the BOC curriculum and program include:

- Following up with program participants to assess content implementation into existing facilities.
- Expanding the number of and improving the dissemination of case studies of model energy efficiency projects conducted by program participants in combination with other demand side management (ex: onsite generation & demand response) improvements when applicable.
- Incorporating BOC materials and findings into broader IOU Centers' curriculum and vice-versa.
- Better integration between BOC and other utility and utility-sponsored integrated energy efficiency, demand response, and distributed generation programs.
- Better integration between BOC and other utility-sponsored energy efficiency education and other demand side management programs, including the BOMA Energy Efficiency Program (BEEP).
- Continuous updating of curriculum materials to include information about monitoring and operating zero-net energy buildings.
- Emphasize diagnostic and troubleshooting strategies in BOC curriculum and include materials of the use of measurement equipment.
- Developing an annual awards program for BOC program participants annual awards program to recognize graduates for their energy efficiency building operations implementation efforts, including improved building performance from measured energy savings, documented improvement in occupant satisfaction/comfort, or document tenant complaints.

IOUs will implement the BOC program statewide, as described above, throughout their territories.

CTAC and AgTAC not only deliver its programs as outlined in Section 4-i) above, but also deliver classroom-style, adult-learning educational and

informational seminars and workshops at off-site locations, including university and local partners venues.

iii. Incentive levels

Not applicable as this is a non-resource, education and information program. Delivers workshops at off-site locations, including university and local partners venues.

iv. Marketing and outreach plans

CTAC and AgTAC not only employ the marketing delivery mechanisms outlined in Section 6-iv, but also employs the following innovative and creative marketing approaches:

E-mail and Targeted and Segment Mailings – E-mail is used as a means of sending the energy center quarterly calendar to customers who have requested receipt via e-mail. Targeted and segment mailings, either by e-mail or postal mailings, are used to highlight specialized seminars and offerings that relate to a specific group or segment.

Highway Sign Board – AgTAC markets selected EE workshops on a highway sign board located in the facility grounds adjacent to Highway 99, which is one of the main thoroughfares from Southern to Northern California.

v. IOU program interactions

CTAC and AgTAC will continue to form and strengthen partnerships with utilities and other agencies to provide consistent Centers programs and services. Some examples of this are the University of Wisconsin – Madison, CEC, DOE, and UC Davis. Collaboration will continue in 2009-2011 through sharing course materials, classes, instructors and advertising. The sharing of these resources ensures a more consistent messaging throughout the state. Also, by coordinating the development and sharing of training materials, opportunities to reduce development costs can be realized, depending on the subject and needs of the specific market audience.

vi. Similar IOU and POU programs

WE&T Centergies is a coordinated statewide effort.

b) Program Delivery and Coordination

i. Emerging Technologies program

The Centers will continue to coordinate and collaborate with the Emerging Technologies program to introduce new equipment, installation practices, and whole building concepts to key market actors. Such support helps expand implementation of new energy efficiency products and services. For example, Energy Centers partner with Emerging Technology projects by: developing demonstration and testing facilities, jointly developing curricula, organizing product showcases, and incorporating new products into training sessions.

ii. Codes and Standards program

The Centers will collaborate through their educational seminars with compliance improvement efforts planned by the codes and standards (C&S) program. Typically, these efforts will focus on training of building department staff. Centers will focus on building standards training for architect, engineers, energy consultants, home performance contractors, home energy raters, and green building programs.

iii. WE&T efforts

Centers represent the largest component of this sub-program group, have many years of experience in creating and disseminating high-quality programs, and provide WE&T curriculum and related deliverables - training courses, seminars, workshops, clean energy technology demonstration, equipment efficiency testing, interactive training exhibits and lectures to promote industry trends and developments for advancing energy efficiency as a professional discipline. Centers are located in the IOU's service territories.

BOC

In alignment with the goals of the Strategic Plan, BOC's curricula incorporate relevant information about the Emerging Technologies and the Codes and Standards programs, and HVAC Quality Installers/Quality Maintenance programs. As appropriate, BOC instructors will enhance the depth of the learning experience by discussing new technologies and ways to meet and exceed the state's code and standards.

Through its two levels of training and certification, BOC offers supplemental training in existing technical positions by providing knowledge and skill building for technician-level facilities personnel including building engineers, stationary engineers, maintenance supervisors, maintenance workers, facility coordinators, HVAC technicians, electricians, general repairers, and head custodians.

BOC has been recognized by several industry and labor organizations as one of value to its members. This recognition reflects the program's efforts to meet the needs of these organizations through solid, industry relevant curricula development. Among the organizations recognizing BOC's training program are the International Facility Management Association (IFMA), the Building Owners and Managers Institute (BOMI), the National School Plant Management Association (NSPMA), local chapters of the society of healthcare engineering, and the California State Employees Trades Council (SETC). NEEC also partners with California statewide partnerships including the UC/CSU/IOU Partnership and other Local Government Partnerships (e.g. Association of Monterey Bay Area Governments).

iv. Program-specific marketing and outreach efforts Energy Centers

Each of the Centers will distribute their own print calendars to a more focused target audience to ensure that notifications of Centers' offerings reach key actors. Innovative and creative approaches will be applied to attract and retain new customers and market actors to the Centers. This will include aligning the Centers' activities with corporate and statewide direction. Centers will contribute content to the Statewide Web portal described in the WE&T Planning Sub Program Section. Classes and other Center activities will be promoted via the Centers' print calendars, through collaboration with professional and trade organizations, through Center's Web sites, through Centers' email communications with students who have opted in to receiving email notifications, and through other partnerships including non-profit organizations, and existing academic channels (community colleges, UC/CSU).

Centers will continue to promote and collaborate in marketing efforts with established and new partnerships involving other utility segments, across utilities, and with government, academic, research, professional/trade, and non-profit organizations focused on efforts supporting the Strategic Plan.

Building Operator and Certification Program

Northwest Energy Efficiency Council (NEEC) works closely with the IOUs to promote BOC seminars. IOU-sponsored BOC classes shall be mentioned in Energy Centers' calendars and email-marketing campaigns targeting commercial and institutional customers. NEEC will also target potential participants with direct marketing materials including informational brochures, case studies and bi-annual bulletins. The program's website also serves as a promotional channel. In 2009-2011, BOC will undertake promotional activities that build on customer interest in national initiatives such as the ENERGY STAR® Challenge and LEED for Existing Buildings. It will also work with large employers to organize closed-enrollment sessions for facilities engineering departments at a single site. Where the IOUs offer the Building Owners and Managers Association (BOMA) Energy Efficiency Program seminars, BOC shall be cross-marketed.

BOC will continue to promote training and certification through its highly successful educational partnerships with professional associations representing the facilities engineers. These include the International Facility Management Association (IFMA), Building Owners and Managers Association (BOMA), Association of Physical Plant Administrators (APPA - higher education), National School Plant Management Association, and the American Society Healthcare Engineering (ASHE). BOC will participate in annual events and program meetings of these associations to share information about opportunities to reduce operating costs through energy efficient building operations.

v. Non-Energy activities of program

The Centers and BOC shall remain focused on delivering education and training content centered around integrated DSM programs, including energy efficiency, demand response and distributed generation. The Centers have and will continue

to explore other program topics that do not have direct energy connections, but that do contribute to improving California's building stock. Such topics include indoor air quality, occupant comfort, recycling, and environmental stewardship and preservation.

vi. Non-IOU programs

IOU program will interact with CEC, ARB, Air Quality Management Districts, local government programs and other government programs as applicable. The Centers will interact with the CEC to develop and deliver training to support improved compliance with building and appliance standards. Compliance with retrofit HVAC requirements is a key strategy in the Big Bold Initiative that will rely on collaborative training efforts.

The Sacramento Municipal Utilities District (SMUD) operates its Energy Technology Center (ETC) that provides similar functions as the IOU's Centers. The IOUs will reach out to SMUD to collaborate on WE&T elements. The IOU's are active with Community Colleges to support and embellish green career technical education. For example, PG&E is working with Laney College to develop and deliver a "Energy Efficiency and HVAC Symposium" targeting career and technical education programs in the Community Colleges. This collaboration will provide professional development for instructors to aid in adjustments to curricula to support green job training. Such an endeavor may set the stage for expanded collaboration to support instructors and develop additional programs. A second example includes active participation in the California Advanced Lighting Controls Training Program (CALCTP) currently underway with several institutions, including Pacific Gas and Electric Company, Southern California Edison, and California Lighting Technology Center. CALCTP aims to deliver a "train the trainer" series of classes to industry groups such as electrical unions and trade organizations.

BOC has and will continue to support CEC adoption of minimum energy efficiency standards.

vii. CEC work on PIER

Refer to IOU's Centers' for details at the local Center level.

viii. CEC work on Codes and Standards

The Centers will work with the CEC and the IOU C&S programs to improve code compliance through coordinated education and training delivery. For more details on these integration efforts, refer to the HVAC WE&T PIP (Program ID# 7f).

ix. Non-utility market initiatives

When applicable, Centergies may coordinate with non-utility entities such as: DOE, CEC, ASHRAE, IHACI, and other independent, non-utility entities.

c) Best Practices

Centers will develop classes, displays, and materials with current information that highlights and relays best practices for efficient installation and equipment through field-experience and case studies from existing programs, including Savings by Design and Energy Design Resources. Centers' offerings will emphasize whole building and system performance in conjunction with design intent. Implementation of hands-on learning methods that are applied in the field create an opportunity for partnering with EM&V and/or 3rd party evaluators to follow up with course participants to assess impact upon practice and/or energy savings. The Centers will continue to implement best practice methods as prescribed in prior statewide evaluation reports.²¹

BOC teaches commercial and institutional facility staff how to operate and maintain building systems for energy efficiency, optimal performance, and occupant comfort. BOC combines classroom training, exams, and in-facility project assignments to train and certify building engineers and operations and maintenance technicians in the practice of energy-efficient building operation and maintenance. The curriculum was developed to provide knowledge and skill building for technician-level facilities personnel including HVAC technicians, electricians, general repairers, and head custodians. BOC curriculum is taught by practicing professionals who implement best practice building operations strategies toward improving building energy efficiency. The curriculum is updated on a regular basis. Trained instructors share best practices with one another as BOC curriculum is updated on an annual basis.

d) Innovation

Innovative and creative approaches will be applied to attract and retain new customers to the Centers. This will include a "re-branding" of the Centers with slogans and tag lines, in alignment with the corporate direction, as well as considering new names for the facilities themselves to make the Centers more easily recognized and comprehended at a glance. A few marketing efforts will be more specifically targeted to smaller commercial, institutional, and agricultural customers, with some activities held during hours that are more convenient to this group. Another initiative is to enhance our web presence to improve the information provided on the web, as well as strengthen our search presence by increasing visibility on search engines.

The Centers will continue to keep offerings up-to-date with current and upcoming technologies.

- Increased use of the Internet to deliver education and training programs as real-time simulcasts, real-time Webinars, and archived on-demand classes. While these applications have been implemented by some Centers in the past, all Centers will implement and progress this delivery method further to reach a wider audience and to increase program cost-effectiveness.
- Expanded curriculum to support California Energy Efficiency Action Plan for 2020 - The IOU Centers will develop teaching material on topics such as climate

²¹ See "Evaluation of the 2003 Statewide Education and Training Services Program" by Wirtshafter Associates, Inc., 2005 and "2004-2005 Statewide Education, Training and Services Program Evaluation" by KEMA, 2007.

change, energy neutral growth, effective mass transit and Plug-In Hybrid Vehicles, and effective implementation of green technologies. Centers will need to pilot, experiment and partner with local Universities, science museums and other parties with expertise to provide a balanced view on these complex topics.

- Emphasis on Adult Learning Principles - Centers will complete the revision of seminar content and curriculum based on adult learning principles to which they were exposed as part of the KEMA program evaluation effort “2004-2005 Statewide Education, Training and Services Program Evaluation”, submitted in 2007. Such learning principles emphasized hands-on “learn by doing” training. Some members of the Centers’ training staff at the centers have been trained on these principles and will integrate them with the goals of promoting energy efficient behavior participating in available EE programs. The expected benefit of utilizing Adult Learning Principles is an increase in participant retention of knowledge, awareness and comprehension leading to greater EE behavior and program impact.
- Centers will work together and collaboratively with other utility groups (i.e. Emerging Technologies) to develop new exhibits with up-to-date technology that can be either replicated and/or shared across utilities to maximize cost-effectiveness of new exhibit development.
- Centers will work together and collaboratively with other utility groups and stakeholders to create an educational series describing paths to zero net energy residential buildings by 2020 and commercial buildings by 2030. This is in support of CPUC and CEC commitments and directives.

BOC Innovation

As a credential program, BOC is uniquely positioned to maintain a long term relationship with graduates through its certification renewal program. Graduates must earn continuing education hours annually to maintain the BOC credential. Therein is an opportunity to direct graduates to the utility education and training centers to earn continuing education hours towards renewal.

Energy efficiency project work also qualifies for continuing education. Graduates may earn continuing education hours through engagement of energy efficiency and demand response projects at their facility. In 2006, almost 20% of BOC graduates earned hours through completion of efficiency projects. Finally, BOC graduates and their supervisors are informed about energy efficiency and demand response program opportunities through the *BOC Bulletin*, a bi-annual newsletter mailed to 1,500 California IOU customers.

Students expressed satisfaction with utility account representative presentations in BOC classes. This should be continued and even expanded on by involving account reps in promoting BOC to key accounts in advance of the course series start date.

e) Integrated/coordinated Demand Side Management

Centers will develop their programs to incorporate other DSM opportunities, including DR, and distributed generation. The Centers have taken the first steps

toward integrating DG and energy efficiency into their exhibits and educational seminars. They have also developed seminars and exhibits focused on DG, EE, and DR. The next step is to work with the DG and DR groups to develop programs that integrate the three in a way that is consistent with other utility programs and with the long-term energy efficiency strategic plan towards zero net energy residential buildings by 2020 and commercial buildings by 2030. Centers will integrate training offerings with codes and standards programs as described in section 6 above.

NEEC recognizes California's demand side management needs are not fully addressed through energy efficiency alone, but rather through a blend of multiple DSM options including rigorous building and appliance codes and standards, demand response, and on-site generation. The BOC curricula are structured to offer flexibility for the incorporation and promotion of relevant demand side management options (rebate and non-rebate) available through the IOUs. NEEC has and will continue to work with the IOU's to customize BOC curriculum to the California market to address technologies and practices associated with demand reduction and to stimulate uptake of utility programs in energy efficiency, demand response, and on-site generation. In 2005 and 2006, BOC curriculum modules were supplemented with material on the topics of enhanced automation strategies for demand reduction and operational best practices to ensure persistence of savings from building retro-commissioning. In 2008, BOC curriculum modules were supplemented with material on the topic of O&M practices for sustainable buildings covering a full range of resource conservation topics. The curricula are also flexible to include information pertaining changes and/or implications to support implementation of and compliance with the CEC's Title 24 to Title 24 2008 Building Energy Efficiency Standards, AB32 (Greenhouse Gas Reduction bill), and other initiatives.

f) Integration across resource types (energy, water, air quality, etc)

IOU Centers recognize that energy efficiency can be achieved through programs that go beyond traditional energy efficiency education and training. The Centers have and will continue to offer seminars and build partnerships that remain focused on energy efficiency and go a step further to show the benefits of energy efficiency upon other areas (e.g. air quality). The Centers will also work together and collaboratively with other utility groups and stakeholders to incorporate the benefits of achieving efficiencies with other types of resources (e.g. water efficiency) upon whole building energy use. This integration can be achieved by developing courses on specific topics like water efficiency since any use of water requires energy consumption.

BOC's Level II course structure offers unique flexibility to integrate the curricula from other resource management areas relevant to building operation and maintenance such as water, waste, and indoor air quality. Level II supplemental classes are offered in tandem with core classes to customize the course series to regional and topical interests in the California building operator market. Three one-day supplemental classes in the topics of water efficiency, O&M for sustainable buildings, indoor air quality, and demand response have been developed and successfully delivered to 500 building operators since the program's inception.

g) Pilots

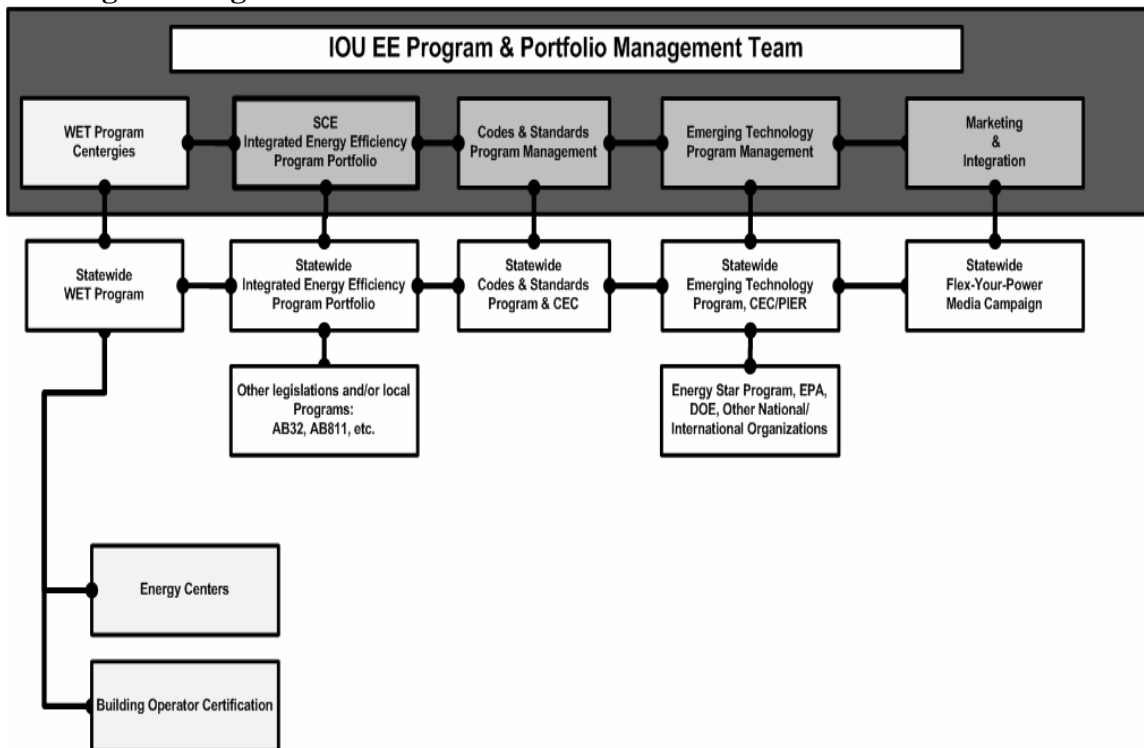
SCE is working with the IOUs on attribution and “train-the-trainer” pilots for the 2009-2011 program cycle.

h) EM&V

The utilities are proposing to work with the Energy Division to develop and submit a comprehensive EM&V Plan for 2009-2011 after the program implementation plans are filed. This will include process evaluations and other program-specific studies within the context of broader utility and Energy Division studies. More detailed plans for process evaluation and other program-specific evaluation efforts cannot be developed until after the final program design is approved by the CPUC and in many cases after program implementation has begun, since plans need to be based on identified program design and implementation issues.

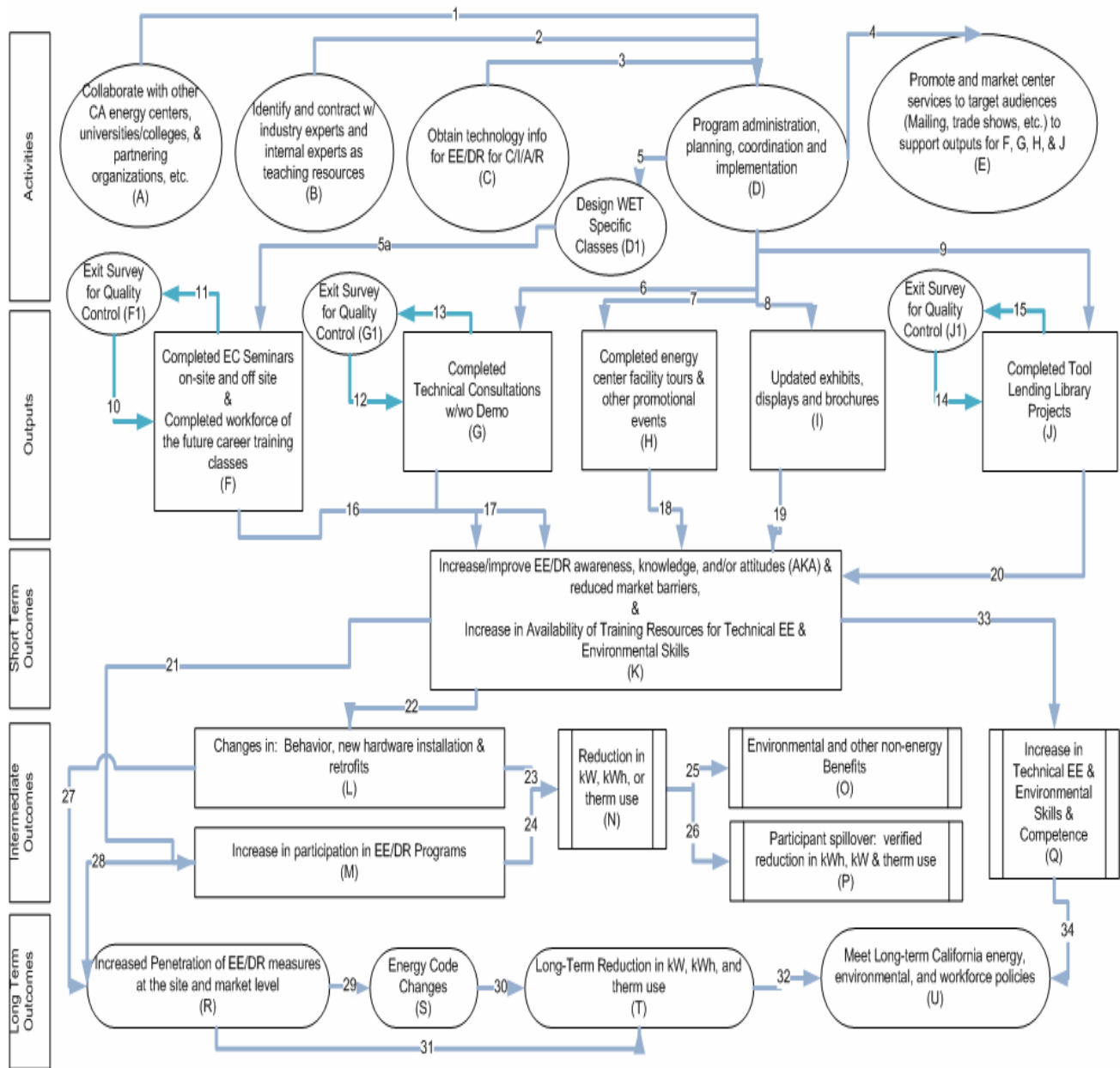
BOC has been the beneficiary of a significant body of evaluation research exploring the program’s impacts on the energy efficiency behaviors of participants. Two third-party process evaluations conducted in 2003 and 2005 of the California Statewide BOC program found high satisfaction with BOC among students and employers. Most students and their supervisors credit the training with increasing students’ energy efficiency behaviors and having a positive influence on energy efficiency decisions at their facilities. Additionally, IOU involvement in BOC reflected well on the utilities and was found to contribute to the program’s overall success.

7. Program Diagram



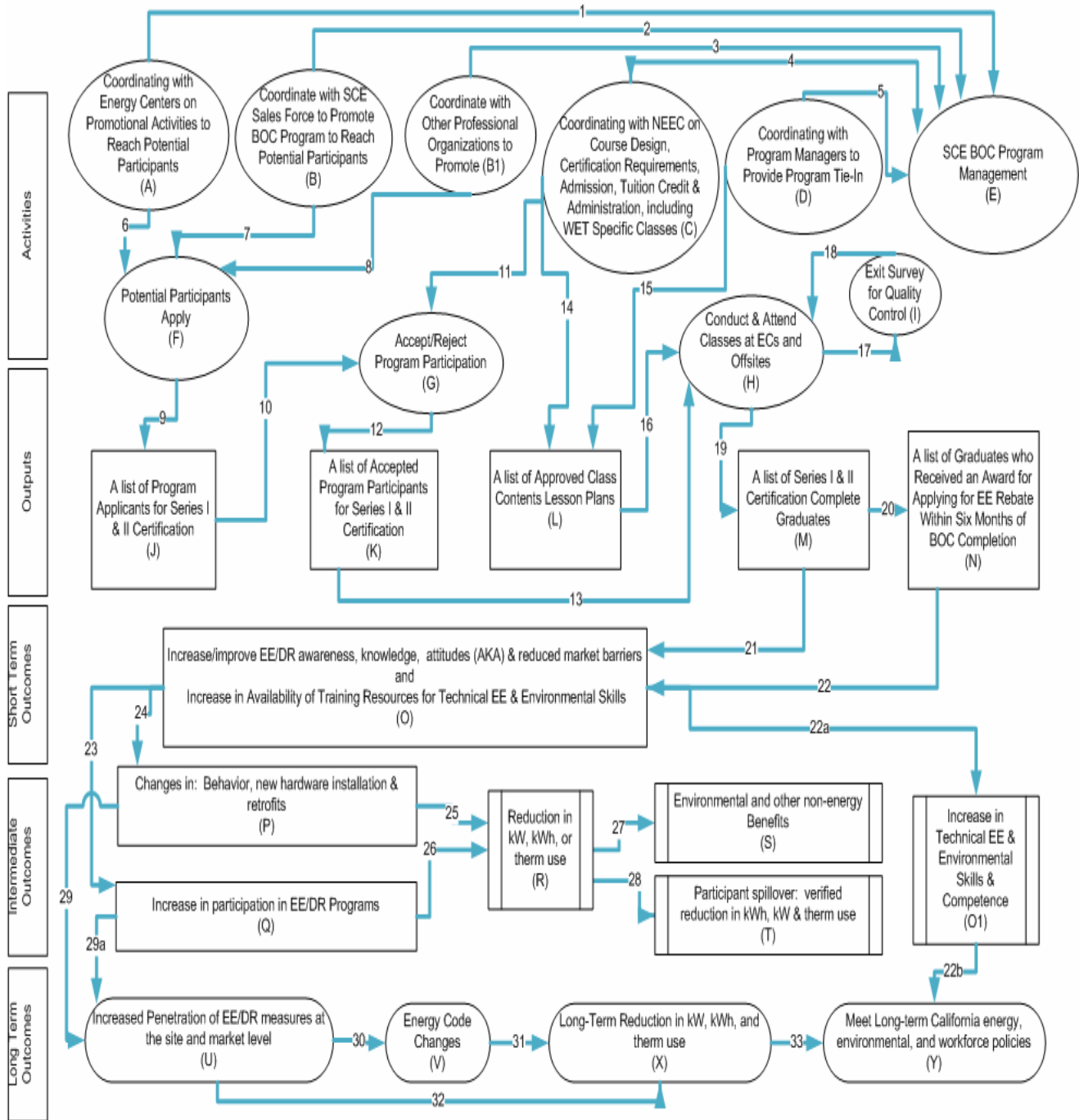
8. Program Logic Model:

PY2009-2011 Energy Center Program (CTAC/AGTAC) - Logic Model



Workforce Education & Training: WE&T Centergies

PY2009-2011 Building Operator Certification Program (BOC) - Logic Model



10b

1. Program Name: WE&T Connections
Program Type: Core

2. Projected Program Budget Table – See core program

3. Projected Program Gross Impacts Table – by calendar year

WE&T is a non-resource program and thus is not expected to provide energy savings to the IOU Energy Efficiency portfolio for the 2009-2011 program years. However, as part of the on-going efforts of the IOUs and recommendations taken from future study results, the IOU WE&T programs are continually seeking methodologies that can support energy savings contributions for WE&T activities.

4. Program Description

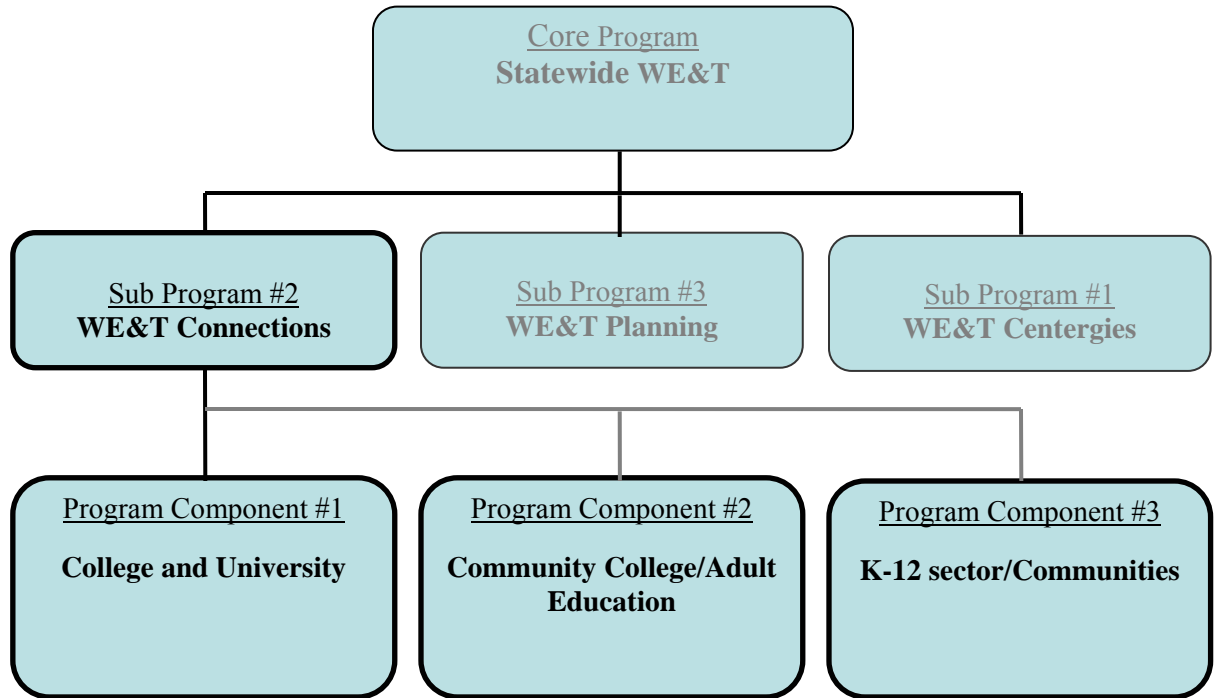
a) Describe program

WE&T Connections is a three-fold marketing, outreach and workforce education & training program. This sub-program offers K-12, Community College and University level education programs that support the Strategic Plan's vision for educating and training California's workforce for "green" jobs.

First, the programs promote green careers to K-12, Community College and University students through energy and environmental curriculum, college credit courses at high schools, college degree programs, job shadowing and internships. The IOUs and/or our third party vendors will work with State Department of Education (Curriculum Commission) as well as County Department of Education to be included in curriculum development advisory boards so that we can contribute to tailored K-12 curriculum that includes the science of energy, energy efficiency and some discussion about green careers. We will also work with the UC Office of the President of Academic Affairs and the CSU Office of Degree Programs and Educational Opportunities to 1) promote energy minor or major degree programs, 2) collaborate and/or provide expertise in the development of complementary new and revised courses that will form a comprehensive integrated approach to energy education, and 3) consult with campus-specific administrators to define additional courses needed to meet the growing need for graduates with skills in energy efficiency and related fields. Throughout the process, we will also work to incorporate and promote a green career path.

Second, the programs are intended to educate students on energy, water, renewable energy, demand response, distributed generation as well as green house gases and the environmental impact, with the goal of influencing day-to-day decisions of students and their households.

Third, the programs educate K-12/community colleges/universities on the benefits of adopting energy efficiency and demand response policies at their facilities to help them save energy and money. Having these programs at schools and campuses serves to reinforce that schools practice what they preach.



b) List measures

WE&T Connections program offers five energy education program components—Green Campus, PEAK, Energenius, LivingWise and Green Schools—and effectively integrates the science of energy, energy efficiency, water conservation, renewable energy, demand response, distributed generation, green house gases to address awareness in the communities, barriers faced by schools as well as growth and demand for green careers. These programs are designed to be both flexible and affective across diverse learning environments as well as to empower K-12/college students to become advocates of smart energy management in their homes, schools, and communities. Each program component will also leverage all other available energy efficiency, demand response, and distributed generation programs for consumers as well as existing business incentives for schools, all to achieve immediate and long-term energy savings and demand reduction in homes, communities, schools and universities.

c) List non-incentive customer services

WE&T Connections is a non-incentive based, education and training sub-program.

5. Program Rationale and Expected Outcome

a) Quantitative Baseline and Market Transformation Information

By its nature, market transformation occurs as a result of numerous factors and programs, not single sub-programs. Therefore, all metrics are proposed at the program level. Please refer to the quantitative baseline and market transformation discussion, presented in the overall program PIP.

Table 3 – Refer to the overarching program for quantitative baseline metrics

b) Market Transformation Information

By its nature, market transformation occurs as a result of numerous factors and programs, not single sub-programs. Therefore, all metrics and goals are proposed at the program level. Please refer to the quantitative baseline and market transformation discussion, presented in the overall program PIP.

Table 4 – Refer to the overarching program for market transformation metrics

c) Program Design to Overcome Barriers

Energy education is critical to assuring a stable and reliable supply of electricity in California. Educating students will create a new generation of Californians who understand the significance of energy in their lives, their role in its efficient use and the importance of managing our limited resources for the future. This knowledge and information can also lead to life-long energy savings habits and a concern for the environment and its limited resources for not only the students but, for their family and friends. This knowledge and education can also lead the interest in a future green career path. However, given the budget cuts at schools, cuts to curriculum and longer work hours for teachers, getting this message across may not be possible without the assistance of these IOU-sponsored programs.

WE&T Connections program components are designed to be both flexible and effective across diverse learning environments. All program components promote the science of energy, energy efficiency, demand response, distributed generation, and empower K-12 and college students to become advocates of smart energy management in their homes, schools, and communities. The program effectively combines classroom learning with hands-on activities.

The program will address lost opportunities in the school market by implementing a comprehensive, innovative approach that involves incorporating:

- Some of the nation's leading energy education programs. These programs are 1) designed to promote green careers through energy and environmental curriculum, 2) designed to educate students on energy, water, renewable energy, demand response, distributed generation as well as green house gases and impact to the environment, with the goal of influencing day-to-day decisions of students and their households, and 3) also designed to educate schools/facilities on the benefits of implementing energy efficiency policies and demand response programs at their sites to impact energy use in schools and, universities and to project energy and environmental leadership by example.
- The program is developed in collaboration with natural gas, electricity and water agencies to promote and encourage the adoption of energy efficiency, demand response, distributed generation and water conservation options.
- Collaboration and integration with residential and business incentive programs that result in firm energy savings for homes and schools.

Energy costs for schools can be an enormous expense and are often the second largest expense for schools after employee salaries. Declines in school funding over the last

Workforce Education & Training: WE&T Connections

20 years have left little to no room in budgets for incorporating high performance measures during major repairs or renovation in existing buildings. This is where our business incentives programs come into play when promoting these educational programs to schools. Not only are these educational components funded by the IOUs, but the schools can also see a measurable utility savings. Also, when the schools teach something that children can take home that helps parents save on their utility bills, the parents are more likely to be active in their students' education. Failure to take advantage of these educational and facility programs represents a significant missed opportunity.

The U.S. Department of Energy estimates that schools could save approximately 20% of their energy costs by incorporating energy efficiency measures²². To start, schools can begin with no cost behavioral and operational changes. Additional funds and/or incentives are needed before schools would seriously consider the more serious energy efficient options.

IOUs will implement several successful energy education components that educate the schools facilities segment on ways to implement low-to-no-cost energy efficiency measures, as well as take advantage of retrofits programs for their facilities. In most cases, the benefit of the IOUs assisting school in ways to save on energy cost is the selling point to getting school district cooperation in implementing the educational components. In fact, most districts return half of the dollars saved to the schools' sites to be used for school supplies and that is the incentive for the school participation. The components also provide K-12 and university students with a unique opportunity to instill a lasting ethic of smart energy management, thus creating a new generation of energy smart citizens and potential future members of a green workforce.

The WE&T Connections program will address the needs of schools through a combination of student, teacher and school administrator education programs and increase their awareness and knowledge as well as provide support in developing curriculum and/or lesson plans that support these objectives. Also, once school-aged children learn something new like energy efficiency, they are great advocates for taking that knowledge home and teaching/motivating their parents and siblings to take actions to reduce energy and water consumption. University students can conduct valuable research and effectively educate their peers as well as campus administrators about energy efficiency:

- Educational campaigns can result in significant energy savings on campus facilities and dorms by changing behaviors and purchasing decisions.
- Students are effective advocates, able to reach their peers, communities and high-level decision makers in promoting green jobs on campus.
- The IOUs and/or our third-party vendors will work with the appropriate (as described in the program description) K-12, community college and university agencies responsible for developing curriculum, courses and programs needed to

²² Per DOE website. [<http://www.eere.energy.gov/buildings/info/schools/>]
[http://eere.energy.gov/buildings/energysmartschools/howto_operating.html]

Workforce Education & Training: WE&T Connections

educate students about energy, energy efficiency and prepare them for a green career path.

Addressing the interaction between energy and water use is essential, as well as the link between energy conservation and the reduction in green house gases. Water conservation lowers energy use and energy bills; particularly, when energy used to heat water can be reduced and energy conservation reduces emission and global warming. The utilities and water agencies will extend the reach of their programs and services and promote integrated solutions.

The desired outcomes of the program are to promote green careers to K-12 and college students to meet California's need for green jobs, to educate and create awareness among K-12 and college students about the importance of energy and water efficiency and how to apply at home and in their communities what is learned at school. A secondary goal of the program is to improve public education facilities and inform facility operators and administrators about the benefits of energy efficient equipment and operation practices.

The basis of the program theory is that increased awareness will result in increased levels of energy and water efficiency in communities and at home where energy conservation starts, and increase conservation efforts at schools and universities. The combination of education and environmental awareness at schools and campuses are expected to motivate students not only to change their energy use behavior, but also to provide them with another very real and worthy option for a career path.

d) Quantitative Program Targets

The program will work toward achieving the following targets over the 2009-2011 program cycle. The proposed targets may be modified due to funding restrictions, especially for the 2009 bridge funding year.

Table 5

Program Name	Program Targets 2009	Program Targets 2010	Program Targets 2011
University Sector			
Green Campus	12 green careers	30 green careers	42 green careers
Community College Sector			
CA Community College	Note: We hope to establish a CC program in 2009.	Note: We hope to establish a CC program in 2009.	Note: We hope to establish a CC program in 2009.
K-12 Sector			
PEAK	12,000 students	14,000 students	14,000 students
Living Wise	33,000 students	33,000 students	33,000 students
Green Schools	25,000 students	50,000 students	65,000 students

Workforce Education & Training: WE&T Connections

Note: There are approximately 6,000,000 K-12 students currently enrolled in California, and our K-12 programs are expected to touch only 9% of the student population over the next 3 years. However, the programs at these schools will serve as a test/pilot environment for energy efficiency and green career curriculum.

e) Advancing Strategic Plan goals and objectives

See core WE&T PIP

6. Program Implementation

a) Statewide IOU Coordination

i. Program Name: WE&T Connections.

ii. Program delivery mechanisms

The educational components offered by the WE&T Connections program provide energy efficiency education and training at most levels of California's educational systems. The program also ensures that minority, low-income and disadvantaged communities fully participate in training and education programs at all levels of the DSM and energy efficiency industry. The expected results are:

- Students develop careers and existing workers develop skills and knowledge that advance DSM business, policy, research and development and education; and
- Individuals from the targeted communities take advantage of programs that specialize in energy disciplines at all levels of the educational system and successfully advance themselves into rewarding careers in the energy services fields.

College and University sector:

Green Campus (statewide)

The Green Campus Program is implemented on UC/CSU campuses by student interns engaged and/or enrolled in environmental studies and/or other related areas. This team of student interns per campus engages other students through forums, and other means on the importance of energy conservation and the link to the environment. They also lead the way in addressing energy efficiency in the higher education sector by meeting with faculty, staff and administrators and work with them to incorporate energy, energy efficiency and discussions about a green career path into their curriculum, and work with them to implement energy efficiency projects and add value with educational outreach campaigns. Green Campus addresses behavioral and operational changes and product retrofits for campus facilities as well as serves as a direct pipeline of emerging environmental/energy professionals.

Green Campus WE&T aspects are exemplified by the advanced technical and professional development skills that the students develop as part of their internship. Green Campus projects include dorm energy competitions, energy efficiency curricula development, building energy assessments and recommendations, technology pilots, and outreach events. Interns actively market their projects and the program by completing monthly newsletters, working with campus and local media and presenting at conferences – including biannual program convergences.

Program Delivery

Student intern assistance to facility management stakeholders; housing and dining; and energy service companies (ESCOs), as appropriate, to help them increase measurable energy savings: Green Campus interns play a key role in helping campus staff, administrators and energy efficiency professionals with their energy savings targets. As a means to this end, students will organize such activities as dorm energy competitions, laboratory fume hood educational campaigns and competitions, technology pilots, office energy assessments and recommendations, etc.

Recruit, train and support Green Campus interns at each campus in implementing program activities. Interns are hired and trained to implement many aspects of the program throughout the school year. Green Campus program staff works closely with interns, campus stakeholders, utilities and ESCOs as they identify their objectives and draft a detailed implementation plan.

Fall planning meetings include student organizers and IOU program managers, campus administrators, facilities staff, faculty, IOU program managers and, energy service company representatives at each campus. After conducting implementation planning exercises prior to or early in the fall term, Green Campus interns will bring new participants up to speed on the program goals, expectations, report on activities conducted to date, unveil future plans, and solicit feed-back.

Building in Efficiency to the Fabric of the Academic Framework: Program staff will work with the UC Office of the President Office of Academic Affairs and CSU Office of Degree Programs and Educational Opportunities to:

- Develop a database of efficiency-related courses on UC and CSU campuses;
- Consult with system-level as well as campus-specific administrators to define additional courses needed to meet the growing need for graduates with skills in energy efficiency and related fields; and
- Diffuse energy efficiency courses throughout the UC and CSU systems through offering all campuses the opportunity to be selected for inclusion in piloting a new Statewide Green Campus Energy Career Pathway Program.

Building the workforce in collaboration with industry: Program staff will organize a California **Energy Efficiency Student Mentoring Program**. This program will bring together the energy efficiency industry, IOUs, government energy regulatory agencies, community colleges, and UC/CSU campuses to pilot an intern program in which students will take a semester off their academic studies to work for a private or public entity doing energy –efficiency related work. The result will be better trained graduates who know the efficiency field and the businesses in it, and energy businesses that have semi-skilled, low-cost help who are primed to join their workforce when they graduate.

Ramping up Green Campus reach: Every aspect of the Green Campus Program offers a pathway to green jobs –academic course offerings, training in technical and “soft” professional skills, experiential hands-on energy efficiency projects, and providing a statewide network composed of utilities professionals, other professionals and academics, students, and program alumni. We plan to increase the number of students who participate in Green Campus activities through growing the “concentric circles” of GC activities:

- Students who are employed as GC interns (approximately 60 students).
- Increase the number of volunteers who participate in GC activities without being paid.
- Interns conducting awareness campaigns on campus will invite students to sign up as honorary Green Campus students and pledge to advance the WE&T message across campus. They will carry the message forward and ask others to do the same. Interns will gather pledge information so that they can be contact via email to gather information on courses they are taking or jobs they might be in.
- Increase the number of students who take classes taught or facilitated by GC interns (currently over 600 per year total).
- Students who are exposed to Green Campus messages on campus (This is already 400,000 student contacts per year statewide).

Ensure that minority, low income and disadvantaged communities fully participate in training and education programs. Green Campus will work with campus EOP Programs to ensure this group of students is also fully engaged in our energy efficiency and green career path programs. Many students do not apply for admission to college because no one in their family has ever attended college or because college seems too expensive. EOP aims to improve the access, retention and graduation of students who have been historically disadvantaged, either socially or economically. EOP assists students by providing admissions and academic support services. EOP serves students from all ethnic backgrounds and Green Campus will ensure that they are fully engaged in this Green Campus program. Working with the EOP program as well as other similar programs will ensure that low income, minority and disadvantaged groups are engaged in the WE&T goals.

EOP provides access opportunities for historically underserved students (Low Income, first generation college) by making higher education a possibility for prospective students with potential.

EOP is empowered to admit those who demonstrate potential, and recognizes that potential is not measured by GPA or standard testing alone.
Mid-year and year-end meetings of all Green Campuses. The mid-year meetings bring interns together with IOU program managers, campus administrators, faculty, and facilities staff from various campuses to share successes, discuss challenges, and plan Green Campus activities for the next half of the academic year. The year-end meetings are used to review the year’s

progress, recognize group and individual accomplishments or best practices, and plan for the summer and following year.

Coordinate with other IOU departments to promote and facilitate business incentive programs. Green Campus through IOU Account Executives will provide information to campus administrators and facilities managers about Business Incentive Programs and encourage them to take advantage of these opportunities for making energy efficiency changes more cost effective. These facilities energy savings programs are needed for two things, 1) the campuses need to get some benefit for these educational programs being on their campuses, and 2) for students to see that campuses are practicing what they are teaching.

Community College sector:

The 2009-2011 California Community College program will build upon, enhance, and streamline the implementation strategies employed in the 2006-2008 partnership, and adopt new strategies over the life of the program as they emerge or are proven as ready for the market. The implementation plan will be refined to adopt best practices and lessons learned program elements for the 2009-2011 programs will include:

An improved program management and structure that adopts lessons learned from the past cycle resulting in a more streamlined, effective approach;
In the process of expanding the existing CCC training and education program from simply training facilities, operations and maintenance staff to include working with community stakeholders on curriculum development for students and industry with the objective of developing future energy professionals and a green workforce. Please refer to Advancing Strategic Plan goals and objectives for details on IOUs role in developing a Utility Workforce Education & Training program as well as our plan to ensure low income, minority and disadvantaged students are included.

K-12 sector:

Some of these programs target the same grade levels but, none of the current or proposed programs target the same districts/schools. We have and will continue to ensure that students participating in one program will not also participate in another similar IOU provided program.

PEAK (statewide):

For the 2009 to 2011 program cycle, PEAK is proposed as a continuation of a successful program by PG&E, SDG&E, SCG and SCE. In the 2006-2008 program cycle PEAK was stand alone in PG&E and SDG&E service areas but, was a joint program in SCE and SCG service areas. For the 2009-2011 program cycles, the IOUs plan to work together to ensure that the program operate as a statewide program. Other changes planned for 2009-2011 are revisions to include lessons on green house gases, DSM and green careers to reflect WE&T goals.

PEAK staff meets with school district representatives, such as principals, to explain the year-long program commitment; plan a customized program for their schools; targeting **3rd through 7th grade levels**. PEAK then trains teachers through its curriculum, hands-on lab activities, and toolkits. In turn, teachers educate their students about the science of energy, energy efficiency and environmental consequences. Using service-learning as a framework, students are prompted to apply their knowledge to real-life situations in their homes, schools, and communities. Throughout the school year, students and teachers are supported in a variety of ways, such as: product distributions, educational assemblies, interactive website and software, e-newsletters, contests, community recognition, and field trips to power plants and renewable energy generation plants. Via the website, PEAK participants are offered structured course curricula recommendations on in a variety of energy efficiency savings topics including: electric, gas, water and renewable energy use. PEAK's diverse offerings foster strong relationships with schools and school districts, as well as a positive connection between the end-user, the community, and the utility.

Program Activities

Home Energy Efficiency Survey (HEES): The program will provide a HEES survey for students to take home and have completed by their parents. The teachers will treat this as a homework assignment and have the kids bring the completed survey back within a specified time. The surveys will then be mailed in to SCE (coordinating IOU) and the families will receive their kit (CFL, showerhead and aerators) in a few weeks. The kit contents are worked into the lesson plans.

PEAK curriculum: The PEAK Teacher Guide Book enables teachers to meet academic content standards in science, math, and language arts for grades three through seven. The curriculum lessons are designed to be covered over one school year. Lessons are designed to be fully comprehensive and contain the following: student learning objectives, lab instructions, post-activity reflection questions and suggested community activities. In addition, each lesson (electricity, gas and renewable energy) emphasizes one or more of the PEAK Student Energy Actions, compelling students to apply their classroom learning to real-life situations and behaviors.

Greenhouse gas and energy career module: PEAK will create a new module/s to include Green House Gases and their environmental impact as well as the positive impacts from energy efficiency, renewable energy, and DR technologies. There will also be a Career development discussion promoting a green career path into their lesson plan curricula.

Teacher training: PEAK teachers participate in a day-long professional development seminar on PEAK's academic content and how to deliver the curriculum in the classroom. Teachers are encouraged to utilize lesson plans from

each segment (electricity, natural gas, renewable resources, GHG, careers in the green workforce) of the program curriculum.

Classroom lab toolkit: PEAK teachers receive a toolkit that contains the supplies needed to complete each hands-on lesson for a class of 36 students. Toolkit supplies are replenished on an as-needed basis.

Energy challenge software: PEAK's website at www.peakstudents.net houses interactive games that allow students to simulate the effects of energy efficient behaviors at home and in the community. The web page will be expanded to include new program features; renewable energy; demand response; green house gases and, their environmental impact; etc.

Energy education in the community: PEAK staff facilitates educational assemblies featuring Bulbman, PEAK's energy-saving mascot. Participants learn such concepts as how electricity is generated, how much energy is saved by a CFL, demand response, green house gases and the 4 Student Energy Actions.

Saving energy at schools facility audits: Facility audits and retrofits of the school site will be offered to PEAK schools to improve energy use and enhance the PEAK energy education. This initiative serves as an additional hands-on student learning opportunity, where students are encouraged to participate in the process and learn about the impacts of proposed changes. Students are also more engaged in energy conservation when they see that the schools are also practicing what they teach. In fact, most districts have energy managers that manage the green effort at schools and, students are able to see a green career in action.

Coordinate with other IOU departments to promote and facilitate Consumer and Business Incentive Programs.

Coordinate events with Mobile Energy Unit (MEU) where available. PEAK program activities are tailored to suit the needs of PEAK participants. This customized approach is implemented in all PEAK activities including planning special events and product distributions, developing teacher trainings, promoting green jobs through career discussions and organizing student field trips. PEAK's proactive support generates a feedback loop which lends itself to quality internal program monitoring and ensures a constantly evolving, living program. PEAK education ultimately produces behavior modifications and attitudinal shifts that result in immediate measurable kW, kWh and therm reductions in both the student's school and home.

PEAK complements each level of the Integrated Demand Side Management model by using education as a means of shifting behavior. PEAK's comprehensive, hands-on program is correlated to the State of California's science, math and language arts standards for grades three through seven. The program teaches students the science of energy and instills an ethic of smart

energy management as well as engages students on discussions about green jobs. Throughout their participation in the PEAK program, students are presented with the necessary tools to formulate thoughtful conclusions about energy usage at the individual and community levels.

ENERGENIUS (possible statewide)

Since 1991, Energenius has expanded and flourished providing educational materials to over 700,000 students in public and private schools throughout the PG&E service area. Expansion statewide with eventual use of the WE&T “Web Portal” as the teacher access point is now possible. These materials are designed for students from kindergarten through grade eight and are correlated to California Content Standards. The seven existing programs include a complete curriculum package featuring detailed lesson plans, student activity booklets, calendars, energy calculators and take-home materials for family members. Program units focus on energy efficiency and safety around electricity and natural gas and include Energenius Kindergarten, Habits, (grade 1-3), Energenius e-Kit (grade 4-5), Energenius Bill Buster, the Light Right program (grade 6-8), Trees and the Environment (grade 4-6), and Transportation, Clean Air and the Environment (6-8).

Learning about energy, energy efficiency, energy safety and the environment should begin in the early years of school and continue through high school and college. This knowledge and information can lead to life-long energy savings habits and a concern for the environment and its limited resources.

Curriculum development

For 2009-2011, *Energenius will develop new program materials*, “Energenius Branching Out”, targeted to upper elementary and middle school students. These materials will focus on energy-related environmental connections, such as global climate change and the linkage between greenhouse gas emissions, energy production and energy use, alternative energy resources, and integrated demand side management. In addition, the materials will go beyond the energy efficiency fundamentals and introduce information on career and job opportunities in energy-related and in the green economy. *This as well as all educational programs will help interest youth in future green career paths.*

High school program

The Energenius Program is a K-8th grade curriculum program on energy, energy, efficiency and the environment. The program does not currently extend into high school. A new program, Green Pathways will be developed and piloted (see 6g) for high school students. This career development program will explore the landscape of environmental and energy careers. Green Pathways enables students to expand and apply what they learned in the Energenius program in the context of developing personal interests and planning career goals and strategies in the green economy. Together, Energenius and Green Pathways provide a comprehensive “green” education and career development program.

School presentations

The program will develop resources and presentation materials to help schools that are interested in going green. Resources will include models for assemblies, classroom presentations or helping them coordinate implementation of green projects at their site. Coordination would include helping them develop an action plan and timeline for implementing the various green projects. Once the plan is developed they will go to the community for support for implementation. The local Waste Management company can help set up a recycling program, the water district and PG&E can do a walk through of the campus to identify water and energy efficiency tips. The class or club would decide based on their time availability what is reasonable to accomplish.

Energy Patrol

School workshops will be conducted using the Energenius Energy Patrol Handbook and videos. Workshops will include an actual monitoring activity and all schools will receive follow-up assistance with implementation... Energy Patrol programs help schools to monitor energy waste and energy efficient actions at the school site.

Green Careers curriculum for secondary students

New program material will include “Living and Working in a Green Global Economy” for High School and exploration of “Green Careers” for Middle School. This program will develop curriculum that is age appropriate to give students information and to invoke an interest in pursuing “Green Careers”. This program will support the Green Pathways Program and will be marketed to career centers and environmental clubs in high schools and the middle school program through the existing marketing channels for the K-8th grade Energenius series.

Curriculum on analyzing energy use

Introduce a mini curriculum that supports the use of the Home Energy Efficiency Survey (HEES). Piloting of these materials is in progress in the first quarter 2009. The goal of this unit is to interest students and their families in ways that they can save energy at home.

Conference, exhibits and presentations

Our goal is to attendance at 10 or more educational conferences per year to promote Energenius materials and workshops and to provide general information on energy efficiency. When possible, presentations during the conference will be done.

Resource guide for teachers

Maintain a yearly update on “Energy Education Resource Booklet” which provides an annotated listing of sites for teachers and students covering issues on energy, energy efficiency and the environment.

Energenius will coordinate with PEAK Student Energy Actions educational program or other K-12 programs where possible. PEAK compliments Energenius by covering demand side management concepts (shifting use to off-peak hours) and the science of energy.

Expansion statewide teachers would be able to access information on these program materials and order them through the statewide WE&T “Web Portal”.

LivingWise (SCG & SCE)

For the 2009 to 2011 program cycle, LivingWise® is proposed as a continuation of a successful program partnership between SCE and SCG. LivingWise program target 5th and 6th grade students, and is usually incorporated into the science and math classes over a 4 week period. Local water providers are also contacted regarding their interest to co-sponsor the LivingWise Program in their service territories. LivingWise® provides classroom learning activities and take-home kits to elementary and middle school classes. The kit contains energy and water-saving products such as a compact fluorescent lamp and high efficiency showerhead as well as other items to introduce energy efficiency and water conservation to children and their parents. The program features a blend of classroom learning activities, hands-on energy survey and installation projects which students complete in their homes with parental assistance. In addition, LivingWise® participants will be provided lesson plans as well as classroom discussion in the area of energy efficiency, demand response, distributed generation, water conservation and careers and job opportunities in the new green economy. These lesson plans come in the form of an activity booklet that addresses electric, gas and water conservation as well as green house gases, renewable energy and careers in green jobs.

Program Activities

Interactive: Interactive school-to-home program for students

LivingWise Activity book: The LivingWise Teacher Activity Guide enables teachers to meet academic content standards in science, math, and environmental. Lessons are designed to be fully comprehensive and contain the following: student learning objectives, post-activity reflection and environmental impacts.

The activity books contain the following lessons:

- Electricity;
- Natural gas;
- Water conservation;
- Renewable energy;
- Distributed generation; and
- Greenhouse gases.

Activity guide and/or presentation revisions: The existing activity guide and or presentations will be modified to include the following:

- Demand response, and
- Careers in the new green economy.

Classroom activity: Teacher-designed classroom activities that reinforce student work on critical State Standards for core subject areas (math, Science, environmental).

Hands-on: Hands-on projects that utilize kits containing energy and water efficiency technologies that students directly install in their homes, thus reinforcing education results.

Family involvement: Involvement of parents to shape family habits and awareness of the benefits of energy and water efficiency

Fully integrated energy efficiency program: Collaboration with Southern California Gas Co and local Water agencies ensures that program covers electric, gas, and water as well as green house gases, renewable energy and careers in green jobs.

Coordinate with other SCE departments to promote and facilitate Consumer and Business Incentive Programs.

Coordinate events where possible with Mobile Energy Unit (MEU). Teachers are required to incorporate lessons from each of the following areas; electricity, natural gas, renewable resources, GHG and green jobs into their math, science or environmental classroom activities as possible. This program is very adaptable to different teaching styles and compliments California's science and math curriculum.

Initial implementation includes program customization to promote utility energy efficiency programs, demand response, distributed generation, water conservation as well as a green career path. The program also features a) pre-survey – that kids complete at the start of the program to determine their knowledge of energy efficiency, b) Household report card – that provide valuable information about household environment and conservation behaviors, c) post-survey – the kids complete after going through the program and allows us to see program effects on their knowledge.

Green Schools (SCE). Green Schools is a comprehensive K-12 program that takes saving energy into schools, homes and communities, as well as brings skills development to high school students as preparation for green jobs. Program staff meets with school district representatives, principals and teachers to develop a customized approach for their schools. Teachers are then trained on its lesson plans and approach. The program's Instructional resource materials, including

lessons in all aspects of energy and energy efficiency, are correlated to California education standards, making it easier for teachers to integrate the lessons into their curriculum and strengthen student academic learning. New for 2009-2011 is a new lesson on green careers in the new green economy where teachers will talk to students about careers in solar, wind, hydro, energy management as well as environmental areas. Our goal is that students will learn and consider energy careers in high school much like they previously learned about going into the medical field, legal field, accounting and public service.

Green Schools teaches about energy from an integrated perspective that includes the science of energy, energy efficiency and conservation, demand response, renewable and distributed generation, environmental and economic impacts of energy consumption and encourages students to consider green careers. Students will learn about green careers or green university courses/programs in their life skills classes and/or from their career counselors. The program also encourages schools to pursue efficiency opportunities from behavioral changes, operational changes, and product retrofits to 1) save energy and reduce utility costs, and 2) for students to see that schools are practicing what they are teaching. A Team of teachers, custodians, administrators and students, work together to develop a tailored plan to implement at the school. Through integrative, project-based learning activities, the Green Schools teams work with students who then become energy-smart educators and efficiency advocates, bringing the conservation message and knowledge about green careers to their schools, homes, and communities. Students learn about energy, ways energy efficiency can help the environment, rewarding careers in the energy field, and will involve their schools and families in energy lessons and energy efficiency practices.

The Green Schools Program provides training and professional development to teachers, custodians, and administrators; trains students to conduct audits of their schools; educates students about career opportunities in the energy efficiency field; and convenes school teams three times during the year to learn how to implement the program, celebrate successes and learn from their challenges. The career knowledge and experience that students gain, with respect to energy and energy conservation, prepares students for a wide range of rewarding energy careers.

Program Activities

Conduct Professional Development Workshop for new school teams.

Program staff will conduct a one-day Professional Development Workshop in the summer or fall of each year to train new school teams of superintendents, principals, teachers and career counselors about the program goals and provide instruction and guidance in planning and implementing their Green Schools activities.

Curriculum Development. Work with California Department of Education (Curriculum Commission) to be included in curriculum development advisory boards so that the Energy sector can contribute to tailored K-12 curriculum and enhance the state-mandated Environmental Education Initiative with more robust energy efficiency curriculum. Afterward, Green Schools will pilot curriculum prior to California Department of Education mandating widespread use of new curriculum.

Instructional Resource Binders. These binders are provided and discussed at the professional development workshop. The resource binders contain the following sections:

- Teaching about energy;
- Alternative energy sources (new);
- Green careers (new);
- Saving energy at school;
- Involving the whole school;
- Saving energy at home; and
- Facilities and custodial staff contributions to Green Schools.

Teachers are required to cover 1) Section 1: background lessons, action lessons, and climate change, 2) Section 4: saving energy at home and at the community, 3) Section on Alternative energy sources: solar, wind, distributed generation and demand response, 4) Section on Green careers.

Promote energy efficiency measures in the community. Each year students will be engaged in activities that promote community outreach and incentive programs. Examples of community outreach activities include tabling at school or community events, student presentations on energy efficiency for community service organizations, and students working with parents to complete energy efficiency surveys. These activities serve to instill this green lifestyle in the students. If the student is passionate about this cause, s/he will be more likely to continue this course in college and or a green career. This function should serve as preparation for this student following a green career path.

Student Energy Audit Training (SEAT). Conduct SEAT program in three high schools and/or middle schools each year. The Green Schools SEAT program educates students about energy and gives them first-hand experience analyzing how energy is used at their school. Students will learn about many aspects of energy efficiency and energy auditing and will conduct basic audits of select areas in their schools. This activity will serve to inspire students to continue down the green career path by pursuing this cause in college or moving directly into the green workforce out of high school.

Develop Career Pathways from High School to Higher Education or Energy Career. Through partnering with school counselors, community colleges and universities to conduct field trips to energy related business and training centers,

conduct school assemblies focused on energy issues and the importance of energy careers.

- Work with existing school clubs to incorporate green job information and training into club activities;
- Providing students with career path information, including relevant degree or certification offerings with community colleges and universities;
- Encouraging students to pursue internship opportunities with the Green Campus program; and
- Organizing career days at the IOUs where students can learn about career opportunities and the important work performed to help the environment and reduce GHG. If this is not feasible, green schools will organize school assemblies where IOU experts can come and talk to students about energy, careers and answer questions.

Mid-Year meetings. School teams meet mid-academic year to share successes and challenges of program implementation and to make plans for the second semester of the school year. Documentation of the meetings will be provided, including the agenda, list of attendees, materials distribution list, second-semester school plans, and workshop evaluation.

Energy baseline tracking system. This function serves several purposes, 1) saves the district/school on energy costs, 2) show the students that the schools are practicing what they teach, and 3) students get to realize the impact of their actions at schools and this will reinforce the importance of energy management careers.

Coordinate with other IOU departments to promote and facilitate business incentive programs. The Alliance will provide information to the Green Schools districts about SCE's Business Incentive Programs and encourage them to take advantage of these opportunities for making energy efficiency changes more cost effective.

Develop, track and report on key performance indicators. Green Schools helps schools reduce energy costs and educates students and their families about energy and the link between efficiency, the environment and finances as well as educate students about careers in the field of energy. It is a comprehensive and long-term approach to school efficiency, bringing together the facilities, instructional and administrative staff in a cooperative effort to improve education using energy as a tool. Its unique approach integrates school facility energy savings with energy savings instruction and action for students to use in school, their homes and their community.

iii. Incentive levels

None

iv. Marketing and Outreach Plans

College and university sector:

Green Campus

Marketing and outreach efforts to increase the transparency of campus energy efficiency goals and results, as well as Green Campus projects: Green Campus Interns will launch termed and ongoing educational campaigns for students, faculty, staff and administrators; in order to achieve and sustain cross-campus buy-in for energy efficiency goals and projects set by individual campuses and/or utilities,

- Promote campus awareness of energy efficiency opportunities and work being done on campus. Green Campus Interns will publish a monthly newsletter describing their ongoing campus outreach efforts, in order to increase awareness about their projects and those of the campus stakeholders and university system. The students will also coordinate to bring a Mobile Energy Unit (MEU) to campus awareness events where available.
- IOU Energy Savings brochures containing details about our commercial and residential EE, DR, DG and Renewable energy programs are provided on campus to administrators and students.
- Please refer to Program Delivery Mechanisms for ensuring that minority, low income and disadvantaged communities fully participate in training and education programs.

Community College sector:

California Community College IOU partnership

The CCC IOU partnership will continue with a training and education (T&E) program focusing on energy efficiency courses for CCC facilities, operations and maintenance staff. The CCC IOU partnership is also actively working with other CCC and community stakeholders on curriculum and Workforce Education and Training Strategies (WE&T) for students and industry to develop a green career path and workforce in support of the Strategic Plan goals. The basis of the T&E program will be to coordinate with the IOU training centers to customize existing course offerings in the HVAC, controls, lighting, commissioning, and green building areas and deliver them to the CCCs via direct training at the campuses or via telecasts or webinars to many campuses on a distributed basis. The CCC approach was established in the 2006-2008 program cycle on a pilot basis, and will expand it to a comprehensive program offering for 2009-2011.

K-12 sector:

PEAK (statewide)

This program will be targeted to associations, school districts and will be included in up to 8 teacher conferences a year. Part of this marketing will include targeting

low income and disadvantaged communities. The method used to identify low income and disadvantaged communities is by the percentage of students on school lunch programs. In fact, our goal is that 50% of program participants come from the low income and disadvantaged groups.

- Information about our residential EE, DR, DG and Renewable energy programs are provided with our Peak program. This information is intended to be included as part of class discussion as well as taken home to be discussed with parents.
- Schools that have used this program and see the impact it has on the students, request the program year after year as well as inform other teachers about the benefits. Even though every year brings new students, we try to broaden the programs reach to a few new schools every year.

Energenius (possible statewide)

The Energenius program will be marketed in four major ways. A targeted mailing is done twice a year, September and February to about 10,000 teachers statewide. The teacher names are acquired through Market Data Retrieval and the mailing is done by the fulfillment house. Another method of marketing includes attending up to 10 teacher conferences a year. Energenius materials are displayed and teachers can order them at the conference or instructed to go online. Program staff attend professional association meetings (distribute information on educational programs) including and not limited to; The Coalition of Adequate School Housing (CASH), California Association of School Business Officials (CASBO); Small School Districts Association and American Association of School Administrators. Additionally, make presentations to school district facility managers and school administrator meetings.

- A great majority of teachers that order these materials year after year and have made it part of their regular curriculum.
- Our marketing will target low income and disadvantaged communities and, our goal is that 50% of program participants come from the low income and disadvantaged groups.

LivingWise (SCG & SCE)

Marketing consists of targeted mailing to schools and districts within the affected service area. Information about the program is mailed, emailed, faxed and made available via a web site. Interested schools or teachers would contact the third party vendor to participate in the program. The third party vendor first validates the schools are in IOU service area by contacting the IOU. Once schools have been involved with the program, they request it again in following years as well as refer other teacher to the program.

- Our marketing will also target low income and disadvantaged communities and, our goal is that 50% of program participants come from the low income and disadvantaged groups. Low income and disadvantaged communities are identified by the percentage of students on a school lunch program.
- Information about our residential EE, DR, DG and Renewable energy programs are provided with our LivingWise program. This information is

intended to be included as part of class discussion as well as taken home to be discussed with parents.

- Teachers truly see the benefit of this program and the impact it has on the students and their families and, it is evidenced by requests year after year to have this program at their schools.

Green Schools (SCE)

Since this program is implemented at the district level, this program is target marketed to school districts in the IOU service area. The program will also continue to expand the reach to low-income students (currently 68% of schools have greater than 50% qualifying for reduced school lunches). This is a K-12 school program but at the request of the PUC, we will make every effort to enroll a greater number of high schools in the program so as to prepare students for careers in the green workforce and/or higher education with an emphasis in a green career.

- Information about our residential EE, DR, DG and Renewable energy programs are provided with our Green Schools program. This information is intended to be included as part of class discussion as well as taken home to be discussed with parents.
- This program was a two-year program for program cycle 2006-2008 but will be changing to a one-year program starting in 2009-2011. The reason for making this program change was to make this program available to more districts/schools/teachers. We receive many district requests asking us to continue the program; however, we cannot forsake all other customers in our service area. We explain that our hope was for the program to provide a foundation for energy conservation to continue at your school district and, offer our support in other ways.

v. IOU program interactions with CEC, ARB, Air Quality Management Districts, local government programs, other government programs as applicable

- Will work with State Department of Education (Curriculum Commission) to be included in curriculum development advisory boards so that we can contribute to tailored K-12 curriculum that includes the science of energy, energy efficiency and some discussion about green careers.
- Will also work with the UC Office of the President of Academic Affairs and the CSU Office of Degree Programs and Educational Opportunities to 1) promote energy minor or major degree programs, 2) collaborate and/or provide expertise in the development of complementary new and revised courses that will form a comprehensive integrated approach to energy education, and 3) consult with campus-specific administrators to define additional courses needed to meet the growing need for graduates with skills in energy efficiency and related fields.
- Will work CBOs, FBOs, NGOs and others through a WE&T taskforce in an effort to advance WE&T goals.

Workforce Education & Training: WE&T Connections

- Will work with water management agencies, air management agencies or other government entities to establish a network of internship opportunities for students in pursuit of a green career.

vi. Similar IOU and POU Programs

Similar IOU programs have been discussed herein.

b) Program Delivery and Coordination

i. Emerging Technologies program

This program will have regular communication with this program as, emerging technologies will be very important in what is taught all levels of the education system.

ii. Codes and Standards program

We have discussed this WE&T effort with Codes and Standards and have agreed to keep the lines of communication open and schedule ongoing discussions.

iii. WE&T efforts

Refer to WE&T Planning section 6c for more discussion on efforts in the education and community sectors.

iv. Program-specific marketing and outreach efforts

See 6.a.iv., Marketing and Outreach Plans, on Page 66.

v. Non-IOU programs

We currently collaborate with local water agencies with a few of our programs and will continue for the 2009-2011 cycle, and we will work to involve and coordinate some of our educational efforts with environmental agencies/groups to show the linkages between energy conservation and the environment.

vi. CEC work on PIER

No anticipated direct work with PIER from these sub-program activities.

vii. CEC work on Codes and Standards

The IOUs will work with the CEC and the IOU Codes & Standards programs to improve code compliance through coordinated education and training delivery.

viii. Non-Utility market initiatives

Refer to WE&T Planning section 6c for more discussion on efforts in the education and community sectors.

c) Best Practices

2006-2008 Process Evaluations are not yet complete but we are prepared to make modifications to programs once a list of improvements are provided.

Green Campus – Lessons learned from past program cycles have been transformed into best practices as well as feedback of past process and impact evaluations, and included in program re-designs. Some recommendations provided in mid-cycle that were feasible for implementation, were implemented successfully. Additionally, initial feedback from 2006-2008 process and impact evaluations has been included in the redesign for the 2009-2011 program cycle. Final evaluation reports and recommendations are not yet available.

PEAK – The first PEAK program was launched in Laguna Beach in 1979 and since then has evolved into the comprehensive, standards based program that exists today, reaching thousands of students across California. Past experiences have led to best practices in the following years.

Energenius - The Energenius program has flourished since 1991 and the program has been enhanced based on feedback from teachers and students. Special consideration is being made to incorporate components into the existing program and the new units that are being developed to include references to green careers in energy efficiency, energy and greenhouse gas issues, and global climate change. The materials are supplemental (not intended to replace a required unit) but complimentary to what is required by the state and have all been correlated to the California Content Standards to enable teachers to justify teaching them.

LivingWise - Lessons learned from past program cycles have been transformed into best practices as well as feedback of past process and impact evaluations, and included in program re-designs. Some recommendations provided in mid-cycle that were feasible for implementation, were implemented successfully. Additionally, initial feedback from 2006-2008 process and impact evaluations has been included in the redesign for the 2009-2011 program cycle. Final evaluation reports and recommendations are not yet available.

Green Schools - Lessons learned from past program cycles have been transformed into best practices as well as feedback of past process and impact evaluations, and included in program re-designs. Some recommendations provided in mid-cycle that were feasible for implementation, were implemented successfully. Additionally, initial feedback from 2006-2008 process and impact evaluations has been included in the redesign for the 2009-2011 program cycle. Final evaluation reports and recommendations are not yet available.

d) Innovation

We will address this area once process evaluations are complete.

Energenius - The program materials have been developed by PG&E so the cost for implementing statewide (printing and developing new programs with statewide reach) keeps the cost low. It is relatively easy to make changes to the curriculum and incorporate information about energy efficiency programs and services, issues related to global climate change, and green careers.

Green Schools - Its unique approach integrates school facility energy savings with energy savings instruction and action for students to use in school, their homes and their community.

e) Integrated/coordinated Demand Side Management

Refer back to section 6a.a.ii of this section.

f) Integration across resource types (energy, water, air quality, etc)

All of the University, Community College and K-12 components will ensure that students understand the science of energy, energy efficiency and conservation, demand response, and renewable and distributed generation, as well as the environmental and economic impacts of energy consumption. Also, the goal is for students to understand the energy-related environmental connections, such as global climate change and the linkage between greenhouse gas emissions and energy use. In addition, materials will go beyond the energy efficiency fundamentals and introduce information on careers and job opportunities in energy-related fields and in the green economy.

g) Pilots

Green Pathways (PG&E) – This program will be piloted in the PG&E service area in 2009/2010. This is a pilot Program for high school students throughout California that will cultivate the next generation of “green” professional and vocational careers. The web-based community will explore the landscape of environmental and energy careers by engaging students in dialogue with practicing and retired professionals in business and industry, professors and researchers in higher education, and local and state government. The program will prepare California’s young adults for post high school green careers and employment by incorporating fundamentals of career development planning and strategy. This will be piloted in the PG&E service area since it will be targeted to 5 or 6 Bay Area schools.

Green Training Collaborative (SCG) – This program will be piloted by SCG in 2009/2010. This is a pilot Program to involve local community education institutions and training programs in energy related career development strategy consortiums. SCG will network with regional implementers of such career training programs to implement projects that allow students and other potential green workforce candidates to explore energy efficiency, integrated demand-side management technologies and resources management techniques. The program would be to add experience to participants pursuing green careers and employment unique to the region. The program will be evaluated to determine best practices that evolve in tailoring career development coordination for specific regional needs. The program will rely upon fund and resource sharing from among the collaborative.

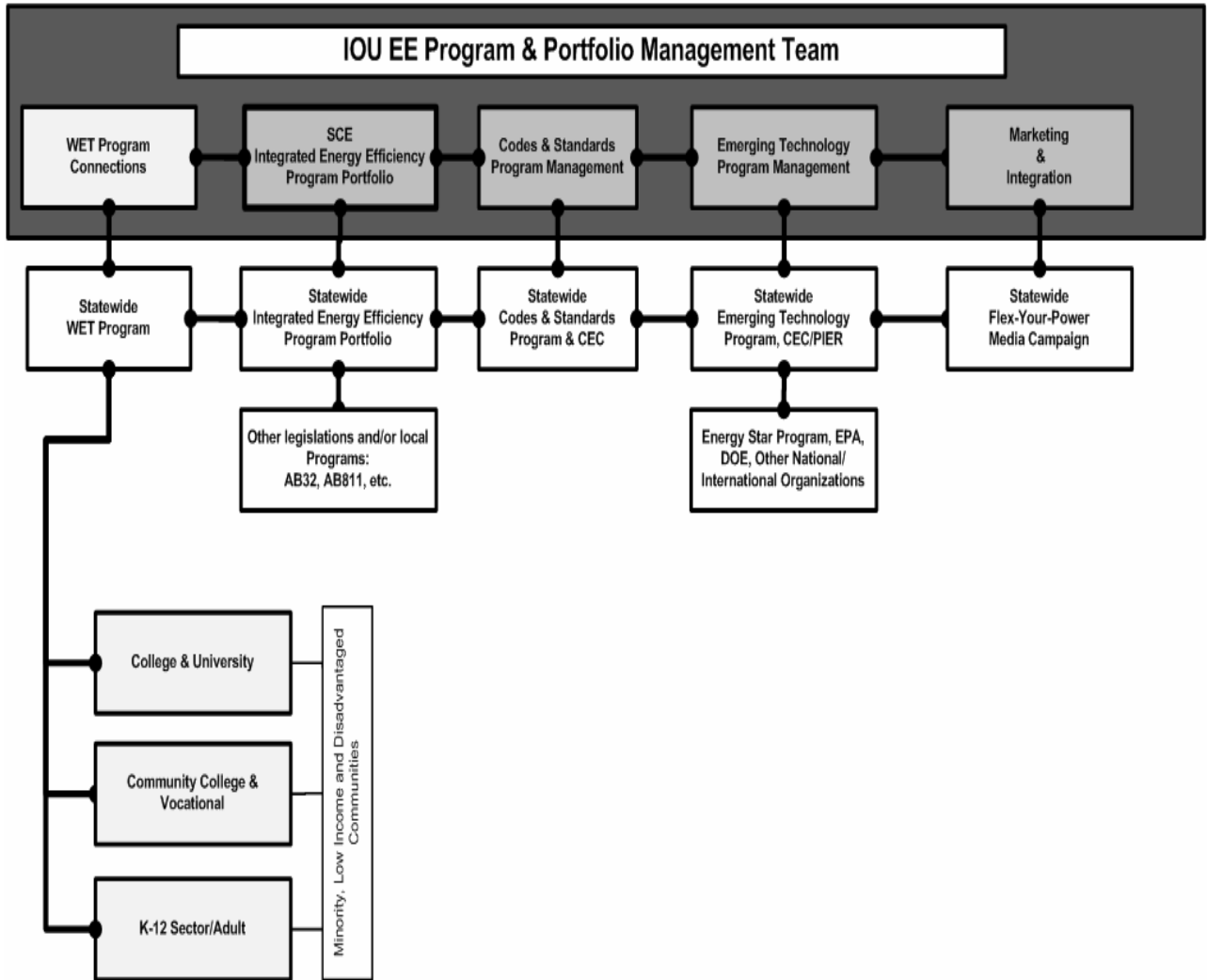
h) EM&V

The utilities are proposing to work with the Energy Division to develop and submit a comprehensive EM&V Plan for 2009-2011 after the program implementation plans

Workforce Education & Training: WE&T Connections

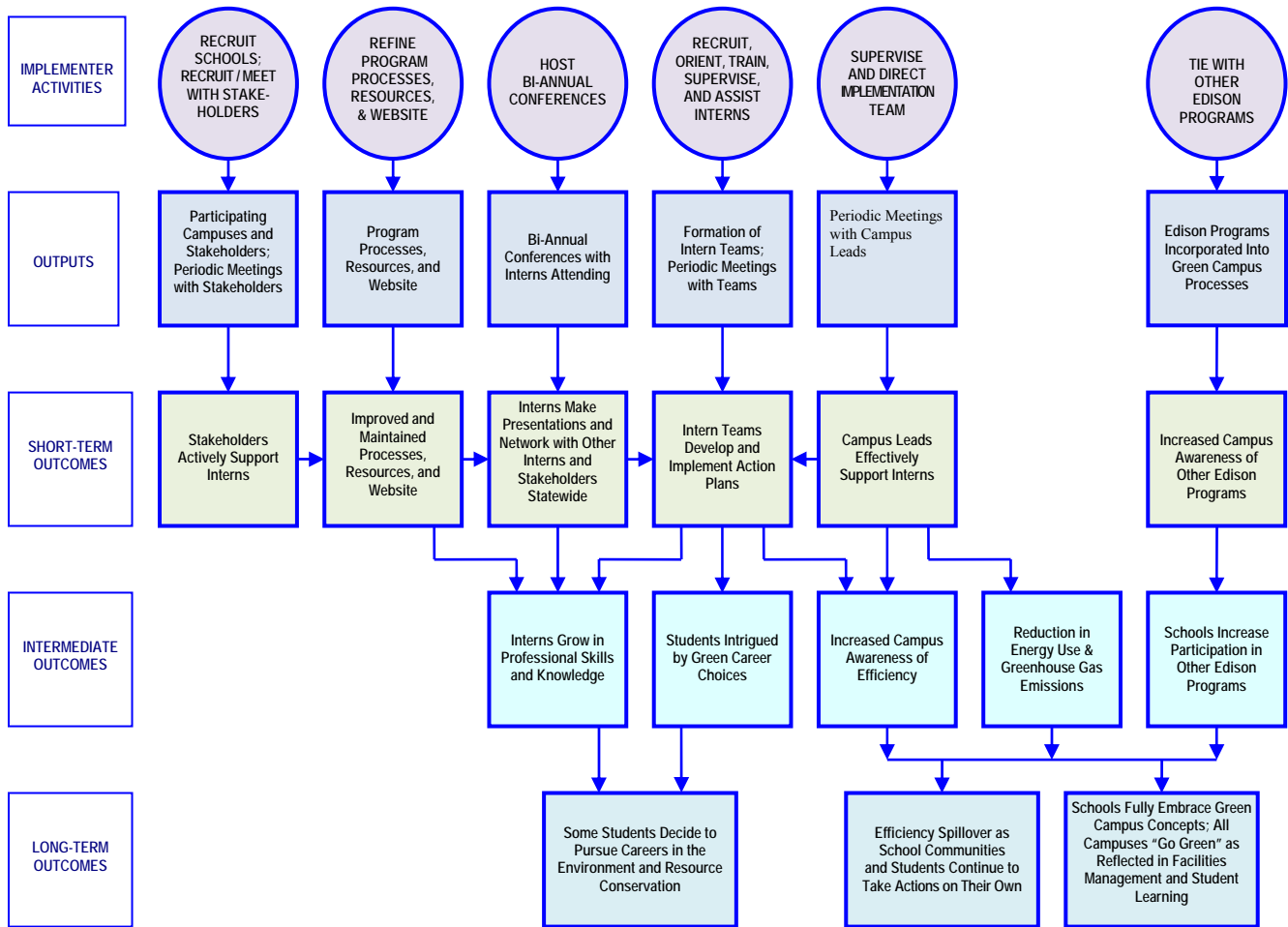
are filed. This will include process evaluations and other program-specific studies within the context of broader utility and Energy Division studies. More detailed plans for process evaluation and other program-specific evaluation efforts cannot be developed until after the final program design is approved by the CPUC and in many cases after program implementation has begun, since plans need to be based on identified program design and implementation issues.

7. Program Diagram

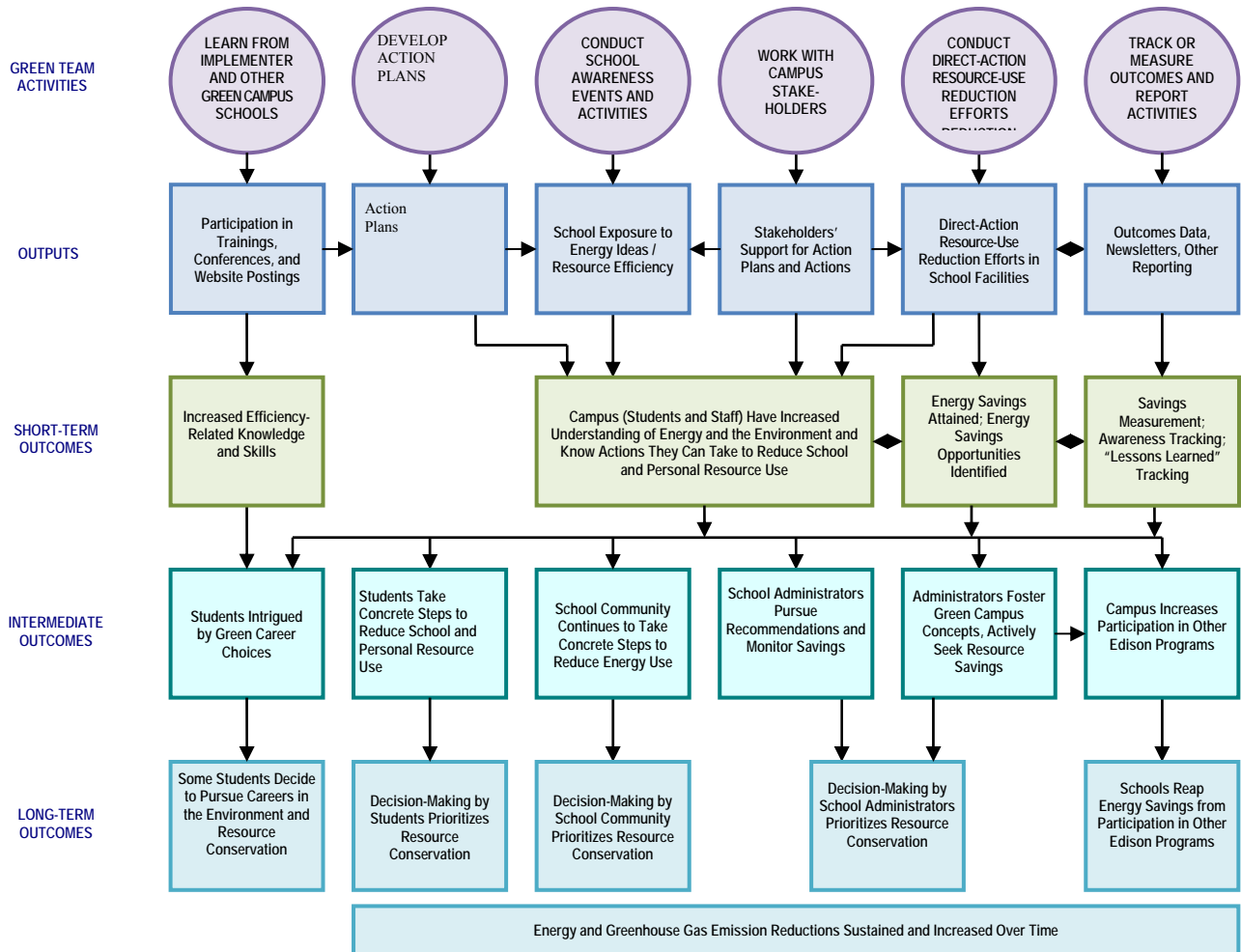


8. Program Logic Models

**Statewide WE&T Program: WE&T Connections
College and University, Green Campus Program
Logic Model for Green Campus Implementer Activities**

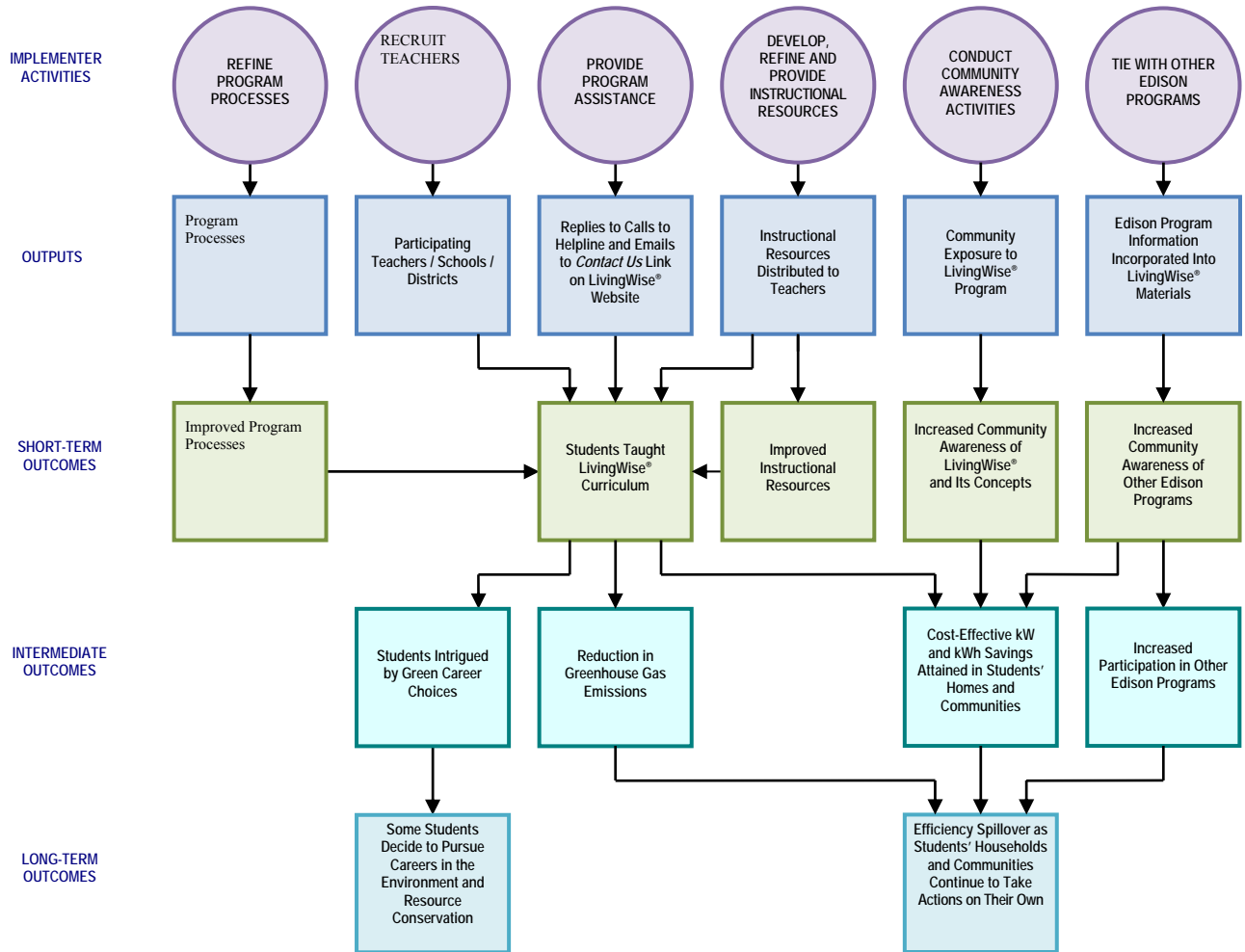


**Statewide WE&T Program: WE&T Connections
College and University, Green Campus Program
Logic Model for Green Campus Implementer Activities**

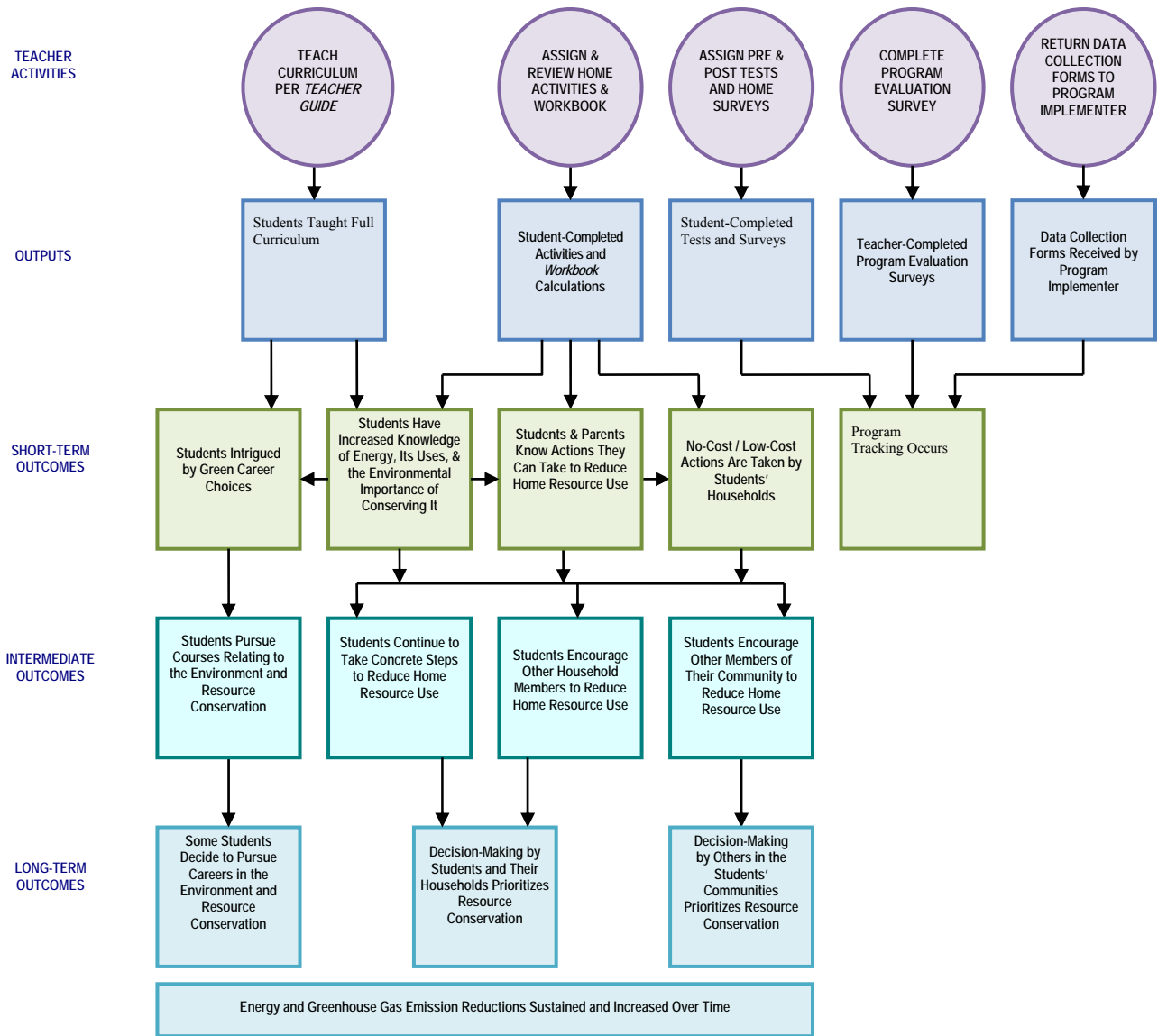


Workforce Education & Training: WE&T Connections

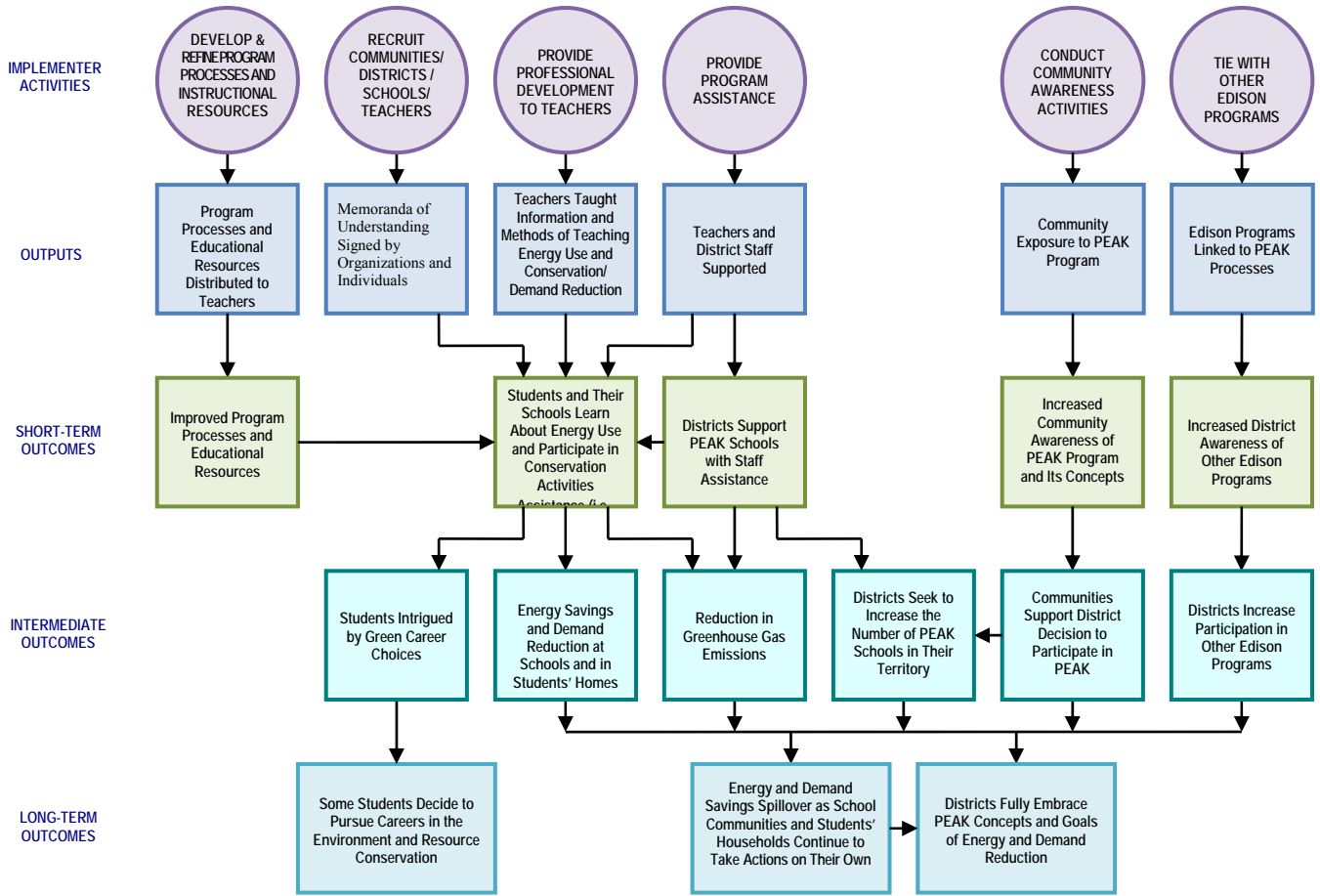
**Statewide WE&T Core Program: WE&T Connections
K-12/ Communities, Livingwise® Program
Logic Model for Livingwise® Implementer Activities**



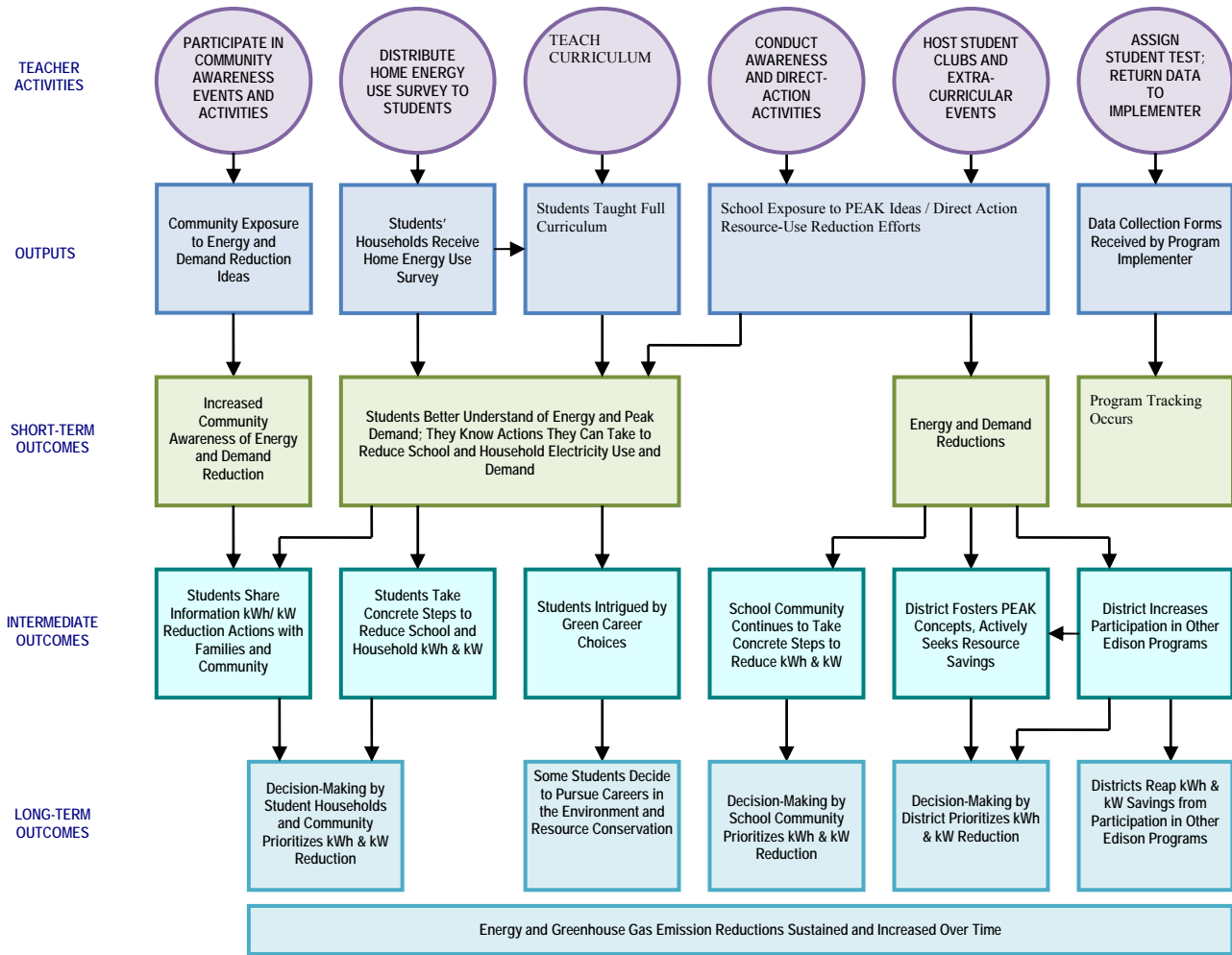
**Statewide WE&T Core Program: WE&T Connections
K-12/ Communities, Livingwise® Program
Logic Model for Livingwise® Implementer Activities**



**Statewide WE&T Program: WE&T Connections
K-12/ Communities, Peak Program
Logic Model for Peak Implementer Activities**



**Statewide WE&T Program: WE&T Connections
K-12/ Communities, Peak Program
Logic Model for Peak Implementer Activities**



10c

Workforce Education & Training: WE&T Planning

1. Program Name: WE&T Planning
Program Type: Core

2. Projected Program Budget Table
Reference the core program for budget details

3. Projected Program Gross Impacts Table – by calendar year
Not applicable because this is non-resource education and training program.

4. Program Description
a) Describe program

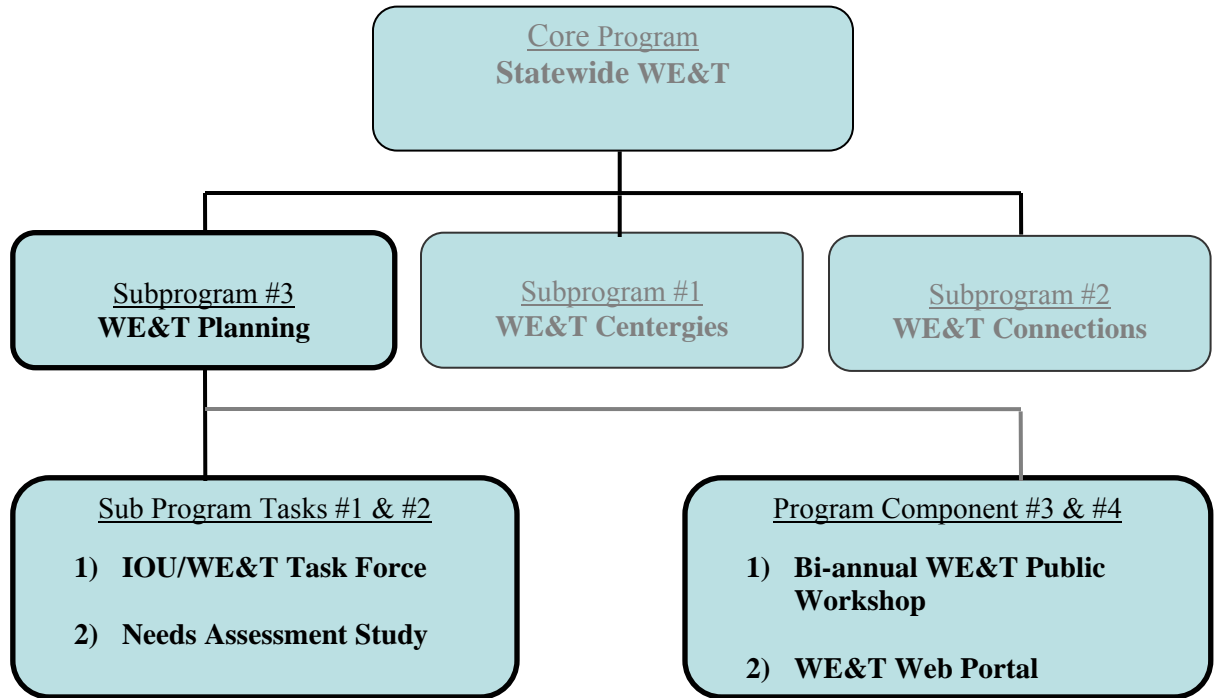
The goal of a statewide Workforce Education and Training (WE&T) Strategic Planning Program is to ensure California's workforce is sufficiently trained and engaged to contribute in achieving the state's energy efficiency potential. WE&T Strategic Planning is a joint IOU program that serves as a planning support and administrative function to accomplish the greater Strategic Plan WE&T long-range activities and goals.

The statewide Workforce Education and Training (WE&T) Planning sub-program is an IOU program formed in direct response to the Strategic Plan. The WE&T Planning involves management and execution of several strategic statewide planning tasks intended to help sustain momentum in long-term WE&T development and strategic planning, including identification of funding streams and market sector specific needs.

The WE&T Planning Sub-Program was created to facilitate implementation and completion of the four key strategic tasks identified in the Strategic Plan to drive long-term WE&T development:

- Form an IOU/CPUC WE&T Task Force;
- Conduct a Needs Assessment;
- Create a WE&T Specific Web Portal; and
- Bi-Annual WE&T Public Workshops.

Workforce Education & Training: WE&T Planning



In order to meet the state's growing workforce demand, a concerted planning effort that includes a variety of initiatives and funding sources beyond ratepayer funds is required. Such an effort will demand the collaboration and involvement of secondary and post-secondary education leaders, technical and professional organizations, state agencies, economic and labor development organizations, utilities, and construction and manufacturing businesses that deliver energy efficiency solutions. The IOUs will support the larger statewide effort, and will help ongoing development of WE&T programs through their WE&T Planning coordination.

b) List measures

Not applicable because this PIP focuses on the Strategic Planning for WE&T.

c) List non-incentive customer services

Not applicable because this PIP focuses on the Strategic Planning for WE&T.

5. Program Rationale and Expected Outcomes

a) Quantitative Baseline and Market Transformation Information

By its nature, market transformation occurs as a result of numerous factors and programs, not single sub-programs. Therefore, all metrics are proposed at the program level. Please refer to the quantitative baseline and market transformation discussion, presented in the overall program PIP.

Table 3 – Refer to the overarching program for quantitative baseline metrics

Workforce Education & Training: WE&T Planning

b) Market Transformation Information

By its nature, market transformation occurs as a result of numerous factors and programs, not single sub-programs. Therefore, all metrics and goals are proposed at the program level. Please refer to the quantitative baseline and market transformation discussion, presented in the overall program PIP.

Table 4 – Refer to the overarching program for market transformation metrics

c) Program Design to Overcome Barriers

The WE&T Planning sub-program is intended to focus tasks that keep statewide stakeholders connected and focuses on delivering a sustainable long-term education and training network that creates a green jobs workforce. The tasks to be completed involve leveraging the resources of the CA-IOWs to help disseminate available statewide energy efficiency curricula and training from among education, labor, industry and grassroots community sectors. This will require a considerable commitment and trust among disparate agencies and entities that make up these sectors where there are inherent barriers which make it difficult to form an effective energy career training network.

The WE&T Planning is a complimentary program to make the best use of IOU resources to achieve multiple objectives. The IOU education and training activities primarily center around utilization of Energy Center and Training Center assets, but training efforts now reach beyond the internal walls of IOU facilities shown in the form of relationships with non-IOU training contractors, education institutions, community groups and governmental agencies. This is important in order for IOUs to help share a role in the growth of coordinated statewide workforce education and training. But just as the IOUs have pursued statewide consistency in offering education and training over several years, expectations to see the same occur among California's various education and training stakeholders cannot be over simplified. The IOUs have represented a reliable and experienced delivery channel of education and training program curricula when few other options have been available. Like other service providers, all parties must expect a process that will involve progressive steps toward solutions that make achievement the State's energy objectives reasonably possible.

d) Quantitative Program Targets

Not applicable.

e) Advancing Strategic Plan goals and objectives

In support of the Strategic Plan vision that "by 2020 California's workforce is trained and engaged to provide the human capital necessary to achieve California's economic energy efficiency and demand-side management potential," IOUs plan to implement a variety of workforce development strategies that encourage and nurture the development of "green collar" jobs through their strategic planning initiatives, and education and training programs.

Workforce Education & Training: WE&T Planning

Training that advances the business of demand-side management, energy efficiency and green energy technology, students benefit, entering careers and advancing the State's very intense energy efficiency goals. Statewide IOU representatives, key traditional education sector representatives, the business community and professional / industry associations at all levels will work together to share protocols and best practices for energy efficiency education through the WE&T Taskforce.

Four specific key actions to be completed in the near term to drive long-term WE&T development and strategic planning. The Taskforce formed from the California strategic plan is intended to identify funding streams other than ratepayer funding, identify market sector specific needs, and inform short-term actions to initiate longer-term strategies for each market and educational sector.

A. Energy efficiency WE&T task force. The Task Force is expected to be comprised of energy efficiency and demand side management IOU program representatives, CPUC staff, labor, industry representatives, and educational experts to fulfill administrative functions including: developing a needs assessment RFP; selecting the third party to conduct the needs assessment; and managing the needs assessment evaluation. The Task Force members will continue to help implement the goals and strategies set forth in this Strategic Plan. Beyond the representation listed above, the WE&T Task Force will rely on commitments for involvement from educators and educational administrators, labor representatives, community-based job training leaders and other non-IOU energy efficiency program implementers. The Task Force is in the early stages of formulation. Reports on existing WE&T related programs and efforts as well as discussion of new WE&T programs and efforts will be core topics of these meeting sessions. The Taskforce will provide a formal framework for all members to get updates, provide feedback and be actively involved in discussing studies, programs, projects, and WE&T efforts being implemented under the strategic plan and other related state initiatives. Task force meetings represent work sessions to review and refine WE&T coordination efforts among stakeholders.

B. WE&T needs assessment. An in-depth formal statewide training and education resource inventory and needs assessment is necessary for long-range strategic planning and delivery. The needs assessment and resource inventory will be structured to produce short-, near- and long-term workforce strategies to support each sector defined in the Strategic Plan. The assessment will be completed by a third-party with its process managed by the CPUC and IOUs, in collaboration with the California Department of Education and other involved stakeholders.

C. WE&T web portal. The web portal will include links to various demand-side management (DSM) related training programs and will allow for a single point of communication. The portal will also serve as a repository for demand-side management and energy efficiency training, educational conferences, and career opportunities. This portal will be created and funded in collaboration with other appropriate entities, and linked to the statewide energy efficiency web portal.

Workforce Education & Training: WE&T Planning

D. Identify and implement specific programs for each educational sector.

WE&T needs are best studied and approached by supporting educational sectors. Thus, five educational sectors have been identified as key in fulfilling WE&T needs and opportunities: Kindergarten through high school, adult education and community colleges, technical training, colleges and universities, and minority, low income and disadvantaged communities.

California must quickly increase and integrate statewide efforts to train people at all levels to plan, administer, and deliver energy efficiency in the public and private sectors. The effort will require planning among secondary and post-secondary educational leaders, technical and professional organizations, state agencies, economic and labor development organizations, utilities, and construction and manufacturing businesses that deliver energy efficiency solutions. The Statewide IOU WE&T Program is directed to initiate ongoing dialogue with market participants and education stakeholders by means of bi-annual stakeholder public workshops to help advance a long-term workforce training designs and plans at all levels of California's educational systems and accommodate the dramatic increase in energy efficiency potential envisioned by the Strategic Plan.

The proposed Statewide IOU WE&T program relies on collaboration among CPUC staff, representatives from the education sector, state bodies, each of the IOUs, professional/trade organizations, and the business community to be successful in initiating energy efficiency training needs, along with recommended existing and potential educational delivery strategies and resources that will serve each market an educational sector in the Strategic Plan through 2020 and beyond.

The WE&T Program is constructed to work in cooperation with the IOUs and the WE&T Taskforce to identify sponsors and funding sources to design and expand effective workforce training activities and projects throughout the state.

Strategy 1-1: Define, initiate and drive long-term WE&T development and strategic planning, including identification of funding streams and market sector specific needs.

Implementation Actions:

Potential Stakeholders	<ul style="list-style-type: none">• Statewide IOU Team, including other utilities as well as internal partners• CPUC Staff• Key traditional education sector representatives, including UC/CSU, community colleges, and accreditation programs• Business Community• Professional organizations, including the AIA and United States Green Building Council
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Workforce Education & Training: WE&T Planning

Sub-program Implementation	<ul style="list-style-type: none"> • Conduct an in-depth formal statewide energy efficiency training and education resource inventory and needs assessment. • Assess current and alternative funding and partnership mechanisms for WE&T activities. • Create a WE&T specific Web portal and identify entities to co-fund and co-sponsor the Web portal with utilities. Partners shall contribute content toward Web portal • Initiate regular on-going dialogue with broad group of market participant and education stakeholders by way of bi-annual workshops. • Establish task force to oversee and help to evaluate utility specific WE&T activities.
Delivery Channel	<p><i>WE&T Taskforce</i> – Conduct resource inventory and needs assessment.</p> <p><i>WE&T Taskforce</i> – Assess and summarize various funding mechanisms for WE&T activities as a needs assessment element.</p> <p><i>WE&T Taskforce</i> – Work with statewide team to develop Web portal for workforce needs.</p> <p><i>WE&T Taskforce</i> – Facilitate the convening of stakeholders for initial and ongoing dialogue with stakeholders.</p> <p><i>Ed Train</i> - Collaborate with WE&T program to inform the process.</p> <p><i>WE&T</i> – Be specific about the scope of work to define what can/will be done and what lies outside the scope of the task force.</p>

Other long-term strategies and implementation efforts included as goals for the Statewide IOU WE&T Program are addressed in detail within the WE&T Centergies and WE&T Connections sub-program sections of the PIP. In summary however, they include:

Strategy 1-2: Support the community college and adult education efforts to allow students to develop their education based on visible career paths in energy efficiency and related fields.

Potential Stakeholders	<ul style="list-style-type: none"> • California Community Colleges Chancellor’s Office • California Board of Education • Adult Education Leadership • Department of Employment Development • Industry and Labor Associations • Business Community • Professional organizations with members who need to maintain accreditation • Building Operators Certification Program (BOC)
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Workforce Education & Training: WE&T Planning

Sub Program Implementation	<ul style="list-style-type: none"> Utilize community colleges to provide technical training, such as HVAC maintenance and building operator certification. Develop appropriate linkages with K-12 programs, focusing on high-school “green academy”. Coordinate with the community colleges and adult education sector to incorporate energy and resource efficiency. Component into their career laddering concept. Explore ways of disseminating materials electronically through effective use of the Internet.
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Strategy 1-3: Incorporate energy / resource efficiency and demand side energy management into traditional contractor and technician training, such as for plumbers and electricians, and expand training resources to produce target numbers of trained workers.

Summary:

Potential Stakeholders	<ul style="list-style-type: none"> California Community Colleges Chancellor’s Office Community College HVAC program California Board of Education Adult Education Leadership Department of Employment Development Industry / Labor Associations Technical and Vocational Training Programs
Sub Program Implementation	<ul style="list-style-type: none"> Expand or establish training curricula and training and professional career development programs in building construction, services, building operator and other energy efficiency technical fields. Establish or expand key financial and placement partnerships that demonstrate employment prospects for trained personnel. Expand upon existing certification programs to try to include student certificate in “green workforce”.

Strategy 1-4: Create or expand college and university programs with energy efficiency focus and foster green campus efforts to apply this knowledge in clear view of students and faculty.

Summary:

Potential Stakeholders	<ul style="list-style-type: none"> California Community Colleges Chancellor’s Office WE&T Task Force UC/CSU education system ACEEE education committee
Sub Program Implementation	<ul style="list-style-type: none"> Utilize existing UC/CSU extension programs to incorporate a continuing education curriculum component. Work with Universities and colleges to expand professional energy related degree offerings and contribute to tailored curriculum.

Workforce Education & Training: WE&T Planning

	<ul style="list-style-type: none"> • Work with colleges and universities to formalize internship opportunities with energy and resource efficiency institutions, including engineering firms, architecture firms, and utility programs.
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Strategy 1-5: Develop K-12 curriculum to include energy efficiency fundamentals (e.g., math, science, behavior) across various content areas and identify how career education in energy-related fields can be incorporated across the grades.

Summary:

Potential Stakeholders	<ul style="list-style-type: none"> • CPUC Staff • Key traditional education sector representatives • California Board of Education • WE&T Task Force • Business community • After-school community education programs
Sub Program Implementation	<ul style="list-style-type: none"> • Identify opportunities to leverage governor’s career technical initiative. • Identify opportunities to work with the California Department of Education to develop curricula with specific content for energy and GHG issues. • Support outreach into • K-12 schools on energy, water and environmental issues. • Support K-12 schools to develop curricula that support their local communities as part of class assignments.

Strategy 2-1: Collaboratively identify appropriate goals and strategies to build California’s energy efficiency workforce through 2020, focusing on training that increases participation from within minority, low-income and disadvantaged communities in achieving California’s economic energy efficiency potential.

The number of units receiving education and weatherization services during the 2009-2011 program period is expected to expand greatly. During 2009, WE&T will focus on expanding behavior modification in existing training programs to increase emphasis on energy efficient practices.

Additionally, training in the form of train-the-trainer sessions may be possible with third party groups to design and expand teaching of weatherization and energy efficiency in minority and disadvantage communities specifically.

Summary:

Potential Stakeholders	<p>WE&T Task Force</p> <ul style="list-style-type: none"> • CPUC • Key traditional education sector representatives • Business Community • California Community Colleges Chancellor’s Office • Continuing Education Programs • Laney & Delta College HVAC program (PG&E)
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Workforce Education & Training: WE&T Planning

	<ul style="list-style-type: none"> • Department of Employment Development • Industry / Labor Associations • Technical and Vocational Training Programs (e.g., State Prison System) • Community Youth Centers (e.g., YMCA)
Sub Program Implementation	<ul style="list-style-type: none"> • Leverage Marketing Education & Outreach and WE&T task forces to partner with community based organizations and provide targeted outreach on employment opportunities with energy efficiency. • Develop Low Income WE&T Plan • Train qualified diverse business enterprises from minority, low-income and disadvantaged communities to undertake or expand efficiency services.

6. Program Implementation

a) Statewide IOU Coordination

i. **Program name:** Workforce Education & Training Strategic Planning

ii. Program delivery mechanisms

Implementation activities will be informed by the statewide scoping study and needs assessment. The IOUs are expected to direct much of the work needed to complete the assessment, which will identify existing WE&T infrastructure and capacity, anticipate future needs, and specify urgent gaps that need to be addressed.

Based on the statewide needs assessment, a strategic plan, outlining at least existing and anticipated green collar jobs, and the skill sets that are likely to be demanded by industry are to be presented. Organizing these skill sets into practical career paths should influence communication, development, and implementation of future WE&T training programs.

Funding for actions based on the above mentioned scoping study, needs assessment, dialogue with stakeholders and task force conclusions will be required to impact the WE&T needs in time to support the urgent needs of the Integrated Demand Side Management (IDSM) Portfolio. Such implementation actions may include collaboration with appropriate educational sectors as prioritized by the needs assessment to act as catalysts to enhance conventional educational efforts to accelerate the mainstream adoption of green career support. The statewide IOU Planning tasks will be shared among any other statewide planning and training implementers and be coordinated, where plausible, with the IOU WE&T Centergies and IOU WE&T Connections sub-programs. A statewide WE&T web portal could ultimately serve as a central repository for exchanging training and job opportunities, as well as statewide and national developments linked to California workforce initiatives.

Workforce Education & Training: WE&T Planning

iii. Incentive levels

Not applicable because this is a non-resource program.

iv. Marketing and outreach plans

WE&T Planning tasks are intended to outreach to minority, low income and disadvantaged communities for greater participation. This more focused and targeted step will be coordinated with IOU Low-income, Community outreach and Community affairs departments, as well as coordination, where possible, with Marketing, Education and Outreach.

v. IOU program interactions

This program will leverage and coordinate education and training within most program sectors, such as: new construction, residential, HVAC, and nonresidential.

vi. Similar IOU and POU programs

This is a coordinated statewide approach which includes SCE, SCG, PG&E, and SDG&E.

b) Program Delivery and Coordination:

i. Emerging Technologies (ET) program

The Statewide IOU WE&T Program will collaborate with Emerging Technologies in an improved manner to allow external participation in the ET process. Working closer with ET to increase knowledge and confidence in emerging technologies, the WE&T programs will help with implementation of these new technologies disseminating information and training to enhance market transformation and acceptance into the marketplace.

ii. Codes & Standards program

The Statewide IOU WE&T Program structure segregates Sub-Program curricula to make it easier to identify training opportunities that: 1) enhance interest in C&S career positions, 2) provide training on the codification process of energy efficiency and green laws, 3) provide direct industry training on energy and green implementation strategies in response to current or impending codes and standards and 4) prepare the workforce for code compliance improvement tasks.

iii. WE&T efforts

The Statewide IOU WE&T Program will support the other IOU Energy Efficiency Programs as appropriate. Please see Section 6.b.iii for each Sub-Program for additional plans, if applicable.

iv. Program-specific marketing and outreach efforts

Not applicable to this sub-program as this is a support element for the overall WE&T program.

Workforce Education & Training: WE&T Planning

v. Non-energy activities of program

Not applicable

vi. Non-IOU programs

WE&T as a strategic platform can help facilitate energy neutral training, coordination and funding among not only IOUs, but other stakeholders linked to California's energy plans.

vii. CEC work on PIER

Plans are unknown at this time.

viii. CEC work on Codes and Standards

This strategy will coordinate with SCE's Codes & Standards program and the CEC to further the codes and standards compliance goals within the Strategic Plan.

ix. Non-utility market incentives

WE&T Planning includes involvement from a wide range of stakeholders. Implemented in the appropriate manner, WE&T Taskforce members will represent technology, industry, government, community groups, utilities, education and non-energy segments which should facilitate discussion on ways to share current and emerging opportunities to expand the scope of existing WE&T training curriculum, but introduce new WE&T training activities in the area of emerging technologies, codes and standards, and non-IOU programs.

c) Best practices

Formulation of statewide WE&T Taskforce and regularly scheduled meetings with statewide WE&T stakeholders represent a best practice that facilitates open discussion among are vested parties. The WE&T planning process will have best practice inputs gathered from evaluation of IOU education and training programs to rely upon in discussing real opportunities and the long-term considerations of programs being shared and presented to the WE&T taskforce and IOUs.

d) Innovation

This is an innovative approach to the degree that statewide coordination and strategic planning for education and training is being done to help shape California's environmental climate and economics in the near term.

e) Integrated/coordinated Demand Side Management

WE&T Planning includes involvement from a wide range of stakeholders. The IOU WE&T representatives in support of the long-term workforce strategy of California to achieve statewide coordination, will work to create coordinated technology demonstration and DSM training to ensure there are no missed opportunities for offering IDSM training and that opportunities to receive such training are made available to the fullest extent possible which will aid efforts in achieving energy neutral buildings by 2020.

Workforce Education & Training: WE&T Planning

f) Integration across resource types (energy, water, air quality, etc)

WE&T Planning includes involvement from a wide range of stakeholders. Implemented in the appropriate manner, WE&T Taskforce members will represent technology, industry, government, community groups, utilities, education and non-energy segments and facilitate discussion on ways to share current and emerging opportunities to expand the scope of existing WE&T training curriculum to include water and GHG mitigation.

g) Pilots

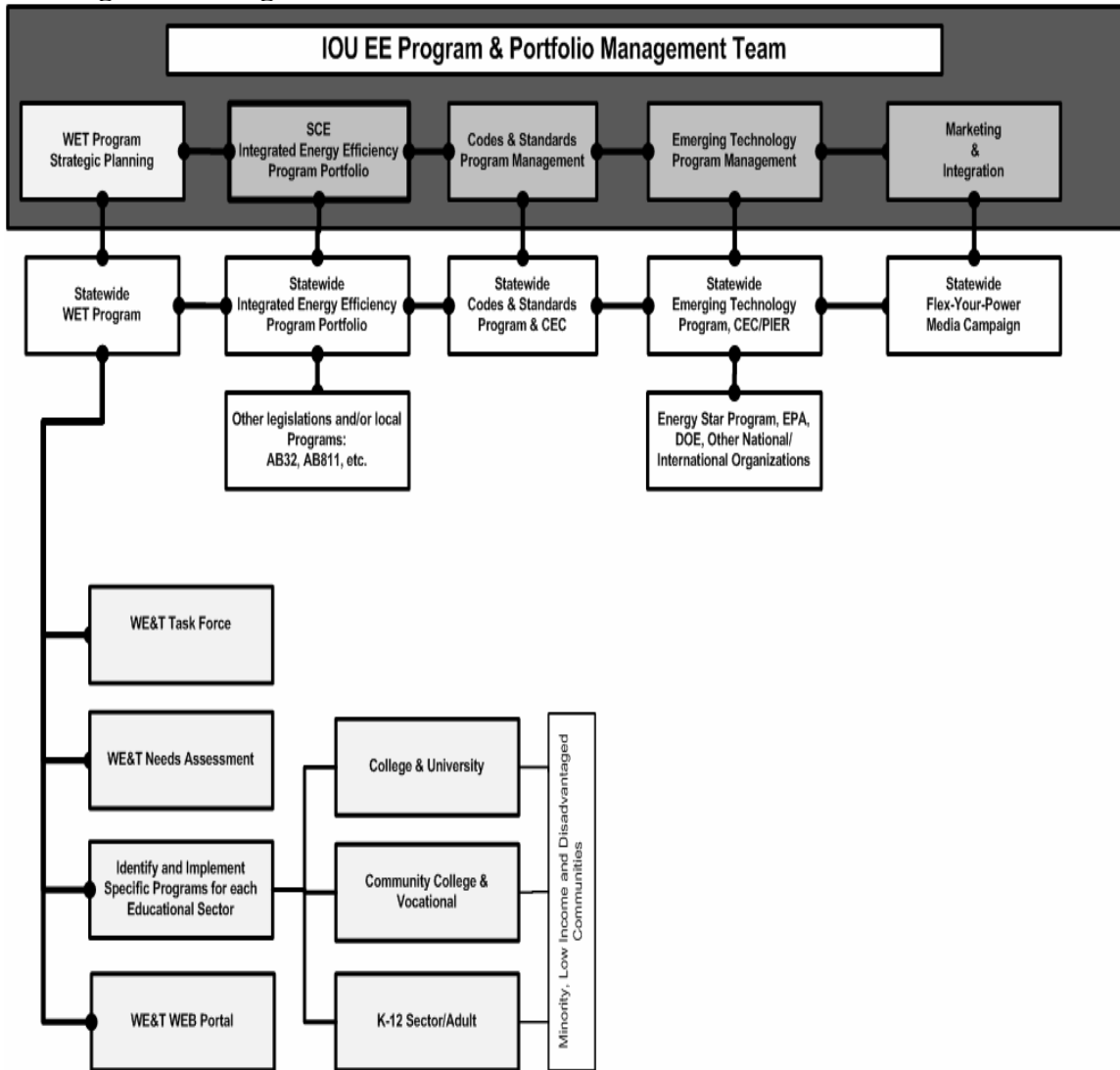
Please describe any pilot projects that are part of this program
The whole program can be considered innovative to the degree that statewide coordination and strategic planning with regard to workforce training is being done in a manner that require iteration and learning in order to arrive at implementation models and action steps that can be deemed effective.

h) EM&V

The utilities are proposing to work with the Energy Division to develop and submit a comprehensive EM&V Plan for 2009-2011 after the program implementation plans are filed. This will include process evaluations and other program-specific studies within the context of broader utility and Energy Division studies. More detailed plans for process evaluation and other program-specific evaluation efforts cannot be developed until after the final program design is approved by the CPUC and in many cases after program implementation has begun, since plans need to be based on identified program design and implementation issues.

Workforce Education & Training: WE&T Planning

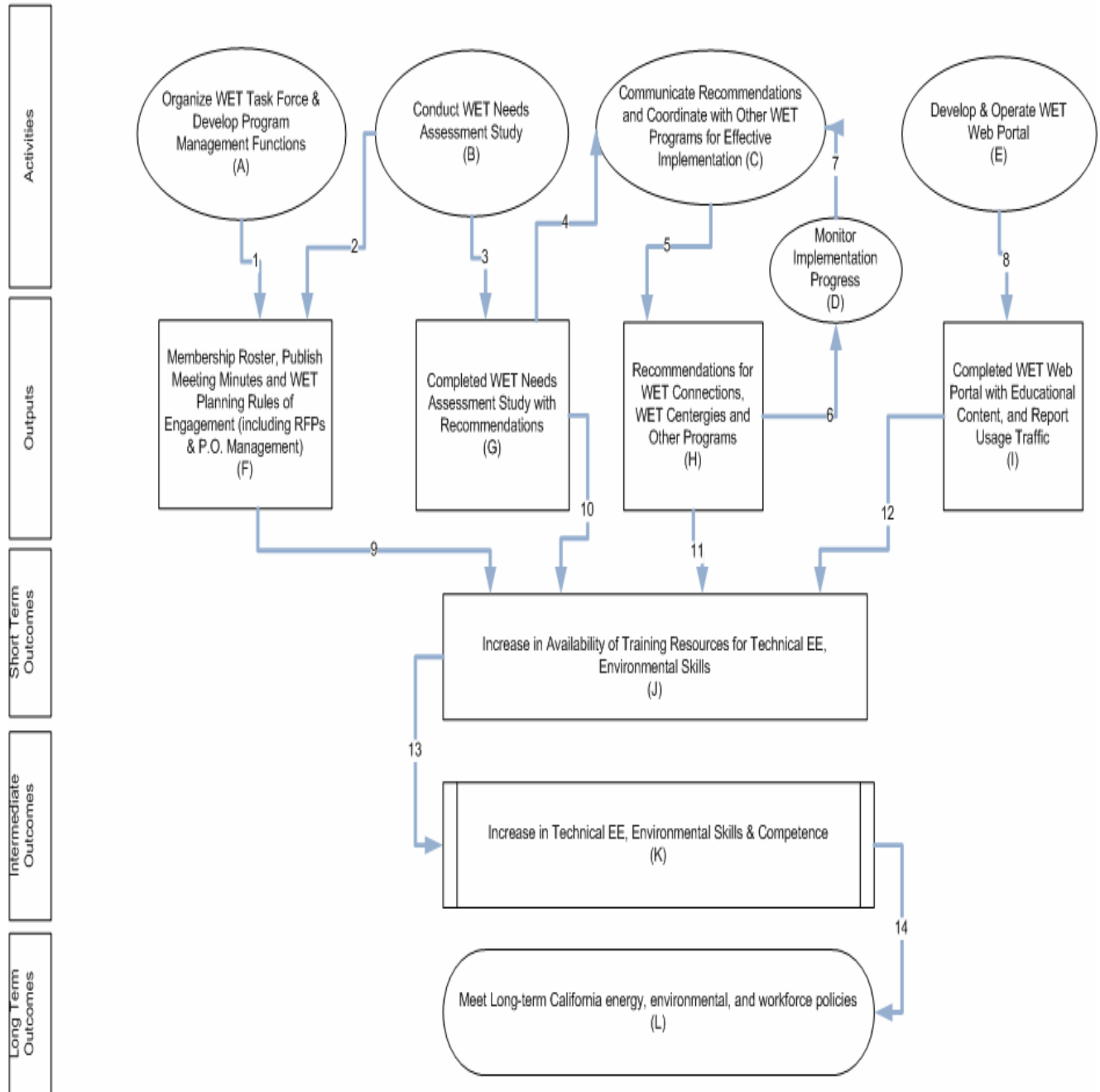
7. Diagram of Program



Workforce Education & Training: WE&T Planning

8. Logic Model

PY2009-2011 WET Strategic Planning Program - Logic Model



Appendix 1

WE&T Database

Green Collar Sector	Admin	Class Location	Ed. Level(1)	Collaborators(2)	Class Length(3)	# of Times / Yr	Approx Annual Cost (IOU)	Approx Annual Cost (Collaborator)	Continuing Education, Entry Level, or Both(4)	Class Component - Codes & Standard	Class Component - Integration - Existing Bldgs(5)	Class Component - Zero Net Energy(7)	Class Component - Low Income Outreach(8)	Class Component - Emerging Technology(8)	Targeted Market Sector(9)	Program Contact(10)
HVAC																
Basic HVAC	IOU	Multiple	Trade/Labor		Half Day	4	\$ 10,848									
ACCA Manuals J, S & D	IOU	AgTAC	Trade/Labor	Air Conditioning Contractors of America	4 day series	1	\$ 16,324									
NATE Certification Training Series	IOU	CTAC & AgTAC	Trade/Labor	IHAC/NATE	8 Various Days, 3 Hours Each	1	EC hosted / \$15,000 paid by EE Programs group									
NATE Certification Exam	IOU	CTAC & AgTAC	Trade/Labor	IHAC/NATE	Half Day	1	EC hosted - No charges for this									
HVAC Systems Testing	IOU	CTAC & AgTAC	Trade/Labor	Joint Utility	Full Day	3	\$ 11,085									
Packaged Unit HVAC	IOU	Multiple	Trade/Labor	Joint Utility	Full Day	5	\$ 18,925									
Designers, Architects, & Building Contractors - New																
Sustainable Building Envelopes	IOU	Multiple	Trade/Labor		Half Day	6	\$ 13,980		4 AIA/HSW credits							
Designers, Architects, & Building Contractors - General (New & Existing Buildings)																
Basics of LED Tech.	IOU	CTAC, AgTAC	Trade/Labor		Half Day	5	\$ 6,925		4 AIA/HSW credits							
Lighting for Architecture & Interiors	IOU	CTAC	Trade/Labor		Half Day	3	\$ 7,050		4 AIA/HSW credits							
Daylighting for Buildings	IOU	AgTAC	Trade/Labor		Half Day	5	\$ 14,925		5 AIA/HSW credits							
Daylighting Controls	IOU	CTAC	Trade/Labor		Half Day	2	\$ 7,460		4 AIA/HSW credits							
Building and Energy Managers																
Intro to Lighting	IOU	Multiple	Trade/Labor		Half Day		\$ 2,330		4 AIA/HSW credits							
Advanced Lighting Technologies	IOU	CTAC	Trade/Labor	Joint Utility class	Half Day	3	\$ 6,255		4 AIA/HSW credits							
CABEC Training	IOU	AgTAC	Trade/Labor		Full Day	3	\$ 1,743									
CABEC Exam		AgTAC, CTAC	Trade/Labor		2 Half Day	3	\$ 483									
Technology Update	IOU	CTAC, AgTAC	Trade/Labor		Full Day	3	\$ 11,085									
Codes & Standards																
T24 - What to expect in 2009	IOU	AgTAC	Trade/Labor		Half Day	1	\$ 1,660		4 AIA/HSW credits	x						
Update on Rules, Regs & Codes in Foodservice	IOU	CTAC	Foodservice Industry	Joint Utility class	Half Day	1	\$ 1,315									
EnergyPro Non Residential Software for Beginners	IOU	CTAC, AgTAC	Trade/Labor		Full Day	3	\$ 9,225		6.5 AIA credits							
EnergyPro 5 update for 2008 standards	IOU	CTAC	Trade/Labor		Half Day	1	\$ 3,485		4 AIA credits							
EnergyPro Non Residential																

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Marketing, Education & Outreach

- 1. Program Name:** Marketing, Education & Outreach
Program ID#: SCE-SW-011
Program Type: Core

2. Projected Program Budget Table

Table 1

		Total Administrative Cost (Actual)	Total Marketing & Outreach (Actual)	Total Direct Implementation (Actual)	Integration Budget Allocated to other Programs (If Applicable)	Total Budget By Program (Actual)
SCE-SW-011	Main Program Name / Sub-Program					
	CROSSCUTTING					
	SW Marketing, Education & Outreach					
	Statewide ME&O	\$ 84,255	\$ -	\$ 18,652,245		\$ 18,736,500
	ME&O Strategic Plan	\$ -	\$ 1,477,014	\$ -		\$ 1,477,014
	TOTAL:	\$ 84,255	\$ 1,477,014	\$ 18,652,245	\$ -	\$ 20,213,514

3. Program Description

The purpose of Marketing, Education and Outreach (ME&O) is to increase utility consumer awareness and participation in cost-effective energy-saving activities offered by the utilities, as well as to promote behavior changes that result in energy management efforts that save energy, and reduce greenhouse gas (GHG) emissions, in coordination with demand response and renewable self-generation options. To be successful, ME&O must move consumers through a transitional process from awareness to attitude change to action.

Californians are currently engaged in a broad public discussion about energy use and its relationship to global warming and the environment. AB 32 set the stage for a statewide transition to a clean energy future by requiring the reduction of GHG emissions to 1990 levels by 2020. Across numerous studies, energy efficiency strategies consistently are identified as uniquely able to significantly reduce GHG emissions and do so with a net economic savings. As a result, there is increased awareness among consumers and businesses to do their part. A strategic window of opportunity exists to use ratepayer-funded ME&O to leverage public and private messages on global warming to achieve greater impact on consumer awareness of, and demand for, energy-efficient actions.

The majority of these outreach efforts have focused primarily on promoting isolated consumer actions, such as buying energy-efficient clothes washers or compact fluorescent light bulbs, or reducing usage to prevent outages during peak periods. By and large, ME&O messages have lacked the comprehensive focus to engage consumers in adopting energy efficiency broadly as a way of life. While messaging that differentiates program and service area issues will remain an important aspect of overall ME&O efforts, the launch of a coherent statewide campaign and energy efficiency brand will be instrumental in bringing consumer awareness of the value of energy efficiency to the next level. Accordingly, it is a top-level priority for the next round of efficiency investment.

Marketing, Education & Outreach

The ME&O Core Program includes two subprograms – Statewide Marketing & Outreach and Strategic Plan-related activities:

Statewide Marketing & Outreach

The 2009 Statewide Marketing & Outreach campaign is a three-firm effort currently implemented under the *FYP* (FYP) brand that has been carefully planned and executed since 2003, with the guidance of and in conjunction with the state’s IOUs and the CPUC. The campaign plans for which they are responsible are:

Efficiency Partnership (EP)	General Market
Staples Marketing (Staples)	Hispanic Market
Runyon Saltzman & Einhorn, Inc. (RS&E)	Rural-Area Market

The objective is to educate ratepayers about how they can take action on energy efficiency by giving them the necessary tools and information on how to do so. Overall, the campaign focuses on providing information resources on purchasing energy efficiency products and services, as well as behavior changes that include conservation and efficiency actions.

Working in collaboration, IOUs have taken great care to integrate our campaign and to avoid duplication and overlap among markets. For example, overriding messages that encourage reduction of energy consumption are essentially the same, and all operate under the FYP brand. IOUs share resources and call to action tools such as brochures, a Web site (www.fypower.org and www.flexyourpower.org) and toll-free telephone line (1-866-431-FLEX). Conversely, IOUs plan and place media so that each campaign augments the overall effort, and doesn’t compete or duplicate mediums. In other words, IOU activities are designed to work in conjunction and are executed accordingly.

During the 2006-2008 program cycle the statewide ME&O program will develop a model that will provide attitudinal air cover for the state’s IOU programs. Thus, the FYP overarching statewide message focused on the problem of global warming and directed consumers to the IOUs for specific information about steps they should take to be a part of the solution. The statewide ME&O effort will continue to integrate among the IOUs and will respond to the uniqueness of respective IOU markets.

Strategic Plan

The ME&O strategic plan is a non-resource initiative, based on collective input and ratepayer funding from California’s IOUs. The goal of the ME&O strategic planning effort is to create a culture in California that practices energy efficiency and other demand side management options as a way of life resulting in both short term and long term behavior change. Because many consumers believe that they are already doing everything they can to save energy¹, a concerted effort must be made to convince them that they can, in fact, do more.

4. Program Rationale and Expected Outcome

¹ Statewide FYP 2007 Tracking Study – Hiner & Partners, Inc.

Marketing, Education & Outreach

Providing fully-integrated Demand Side Management (DSM) program offerings that help Californians manage their energy use is central to achieving the state's goals for energy efficiency and carbon emission reductions. As such, the ME&O strategic plan sets forth a requirement to conduct an equity assessment of the current Energy Efficiency statewide marketing & outreach brand, FYPFYP, as a starting point to creating a recognizable, trustworthy DSM brand for California. Secondly, a web portal will be created that serves as a clearinghouse for readily available information about DSM policies, programs, information, services and products. The web portal will also be used to direct customers to local utility programs. The full deployment of California's new DSM brand is anticipated to occur during years 2010-2011 of the statewide ME&O 3-year program cycle.

a) Quantitative Baseline and Market Transformation Information

By its nature, market transformation occurs as a result of numerous factors, and can not be directly attributed to all program efforts. Market transformation metrics cannot be readily offered for this program.

Table 2 – Quantitative baseline metrics cannot be readily offered for this program

b) Market Transformation Information

By its nature, market transformation occurs as a result of numerous factors, and can not be directly attributed to all program efforts. Market transformation metrics cannot be readily offered for this program at present.

Table 3 – Market transformation metrics cannot be readily offered for this program

c) Program Design to Overcome Barriers:

Refer to sub- program descriptions, which start in Section 5.

d) Quantitative Program Targets

Not applicable.

Table 4 – Not applicable

e) Advancing Strategic Plan goals and objectives

The CPUC's decision D.07-10-032 directed that the current statewide marketing & outreach approach be changed significantly, under Commission direction and oversight, beginning in 2009 in order to better leverage ratepayer ME&O funding for more effective results.

- 5. Program Implementation:** Program implementation is captured within the sub-program descriptions, below. As presented, the following subprograms follow the categories requested in the PIP template, as necessary to adequately describe each subprogram element. Descriptions are presented following a format of “[PIP template section].[Sub-program numeral]” in an attempt to more clearly present program elements. In doing so, outline numeration reverts to non-sequential PIP outline numerals.

Marketing, Education & Outreach

3.1 Subprogram – Statewide Marketing & Outreach

a) Program Description

FYP General and Ethnic Market Program

EP is responsible for implementing the 2009 FYP general and ethnic (with the exception of Spanish-language television) market program. This program is a statewide energy efficiency marketing and outreach initiative that extends the innovative and historically successful FYP public education and outreach effort launched and implemented by the State of California through EP in 2001.

The 2009 FYP general and ethnic market campaign will continue to urge Californians to become more energy-efficient by purchasing energy-efficient lighting, heating and cooling equipment, appliances and other products and services, as well as behavior change.

In 2009, the FYP energy efficiency campaign will provide messaging statewide and across service territories and media markets, through television, radio, online, and in some ethnic markets, newspaper advertising. It also will research, write and post the content and host the FYP Web site (www.fypower.org) and other activities related to the web site and Internet. In addition to general market advertising, FYP advertises in-language in Cantonese, Mandarin, Korean, Vietnamese and Spanish, and to the Filipino, Asian-Indian, Japanese and African-American ethnic markets. It also provides content and hosts the FYP web site in Chinese, Korean, Vietnamese and Spanish. Additionally, EP will continue to target the commercial, industrial, governmental and agricultural sectors, primarily through E-Newswire, the FYP blog and the relevant sections on the web site, including tips, best practices, etc.

The 2009 FYP campaign will continue to coordinate with the IOUs, municipal utilities, water agencies and non-utility, third-party program providers by making information available about their energy efficiency programs.

EP will transfer the outreach aspects of its program, including events and collateral material distribution, to the IOUs and other implementers that have funding for outreach activities. EP will continue to focus on building its online communication strategies and maximizing the reach and frequency of its targeted general and ethnic market advertising strategies in all media markets in California.

Univision Television Spanish-Language Marketing

Staples' Spanish-language television component of FYP uses the unparalleled power of Univision Spanish-language television to reach California's Spanish-speaking Hispanic population. The Spanish-language television campaign creates synergy with the general market and rural market campaigns by using the same theme and branding elements and incorporating message points that have been vetted by the California Energy Commission for mutual use. Beyond that, the Spanish-language television campaign is informed by secondary research, focus groups and other input from Spanish-speaking Latinos in California to craft a campaign that meets their language needs and resonates with their shared culture.

Marketing, Education & Outreach

At the core of the campaign is a 16-week television schedule of 30-second commercials and 10-second bonus spots promoting energy efficiency programs and initiatives. For 2009, the campaign will focus its television schedules around the peak usage period of summer and early fall. The television campaign is supported by earned media, online, text messaging and special events.

FYP Rural Market Program

RS&E is tasked with implementing a statewide campaign to encourage reduction of energy consumption in the rural markets of California. The FYP rural market program is a comprehensive outreach campaign designed to complement the efforts of the IOUs and other program implementers.

In 2009, the FYP rural effort will build on the momentum established in the 2006-2008 program cycle by using traditional print and radio mediums, as well as extensive grassroots local outreach through unique partnerships with as many as 20 community-based organizations (CBOs). Because Latinos make up the largest minority group of residents living in rural communities, RS&E will also continue to implement its well-established Hispanic media partnerships that greatly expand the value of more traditional media buys with earned media and outreach event opportunities. RS&E will also support Hispanic outreach efforts through the creation and production of a fotonovela, an excellent tool for communicating with the Hispanic market. These printed media outreach tools, similar to a comic strip, tell a story that will integrate energy efficiency themes and information. Fotonovelas are especially popular among Mexican Latinos and offer a platform for addressing social issues and concerns using a graphically illustrated language.

In addition, RS&E will launch pilot programs to test new ways to expand its rural-area communications, including funding and working with a health care organization and Hispanic groups. In response to a recommendation made in Opinion Dynamic Corporation's process evaluation of the 2006-2008 campaign, RS&E will test pilot a partnership with an urban CBO to further support campaign messages in an urban environment. The goal is to expand even further in the 2010 program year and beyond by funding more urban market and Hispanic CBOs, as well as organizations with specific missions like healthcare that can support the FYP program.

b) Problem and Program Solutions to Overcome the Problem

To accomplish the stated goals of the State of California, including the goals of AB32 and the CPUC's Strategic Plan, Californians need to make energy efficiency "a way of life." California residents and businesses will have to purchase energy-efficient products and services and change energy use behavior for California to achieve its goals. There are limits to how much of this market transformation can be accomplished through utility programs, such as incentives due to constraints on the financial resources available, to achieve the needed energy savings through resource programs alone. Therefore, statewide ME&O is a necessary strategy to promote the purchase and widespread, wise use of energy-efficient products and services and foster sustained behavior change. It is also essential to support IOU, third-party and other energy efficiency programs in California.

Marketing, Education & Outreach

Over the years, the FYP statewide ME&O program has a demonstrated track record of increasing Californians' propensity to save energy at home and in businesses by purchasing energy-efficient products and services. It has done so by building awareness and acceptance of energy, financial and environmental benefits of energy efficiency, and therefore has increased the motivation to become energy-efficient. Through synergistic and comprehensive marketing and outreach activities, the FYP programs have had a significant statewide impact in transforming the market in California.

Challenges still exist. One such barrier to market transformation is that California's population is extremely diverse, requiring a more segmented approach to the target markets. The agencies will continue to further target their audiences and messages to the extent possible within a shrinking budget. To that end, the general and ethnic market, Spanish TV and rural market programs are implementing tactics aimed at reaching segments of their target markets, including increased use of Internet- targeting strategies, increased use of more closely targetable radio and cable TV strategies, piloting Hispanic CBOs in the rural communities and leading Spanish-speakers to flexyourpower.org through Spanish-language web portals and text messaging.

c) Program Goals, Strategies and Measurable Objectives

The combined FYP programs share the following goals:

- Maintain and expand awareness among Californians of the benefits of curbing energy consumption (e.g. save money, protect the environment, serve the greater good of the community);
- Promote and expand the opportunities to purchase energy-efficient products and services, and additionally to participate in utility and other programs whose objectives are also to facilitate energy -efficient actions;
- Educate and direct consumers statewide as to the specific measures and behavior change they can take to save energy, e.g. replace old refrigerators and appliances, use CFLs, adjust thermostats, reduce standby energy, install ceiling fans and use energy-efficient cooling equipment; and
- Channel Californians to products, services, resources and behaviors that save energy, e.g. contact IOUs about energy conservation incentive programs, develop new habits (behavior change).

The strategy for 2009 is to take advantage of current market conditions and build on the momentum generated in the past program cycles. We are aware that a brand assessment effort will be launched and a web portal will be developed in 2009. The strategies for the coming year take those realities into account, while still leveraging the existing brand. In 2009, the objective of the three FYP programs is to deliver a highly-coordinated marketing and outreach program through consistent use of measures, messaging, and logo, as well as maximizing the FYP web site as the source for accessing information, resources and programs and ultimately, directing customers to local utility programs. When/if a new brand is launched, we will work with the CPUC and ME&O Task Force to implement the brand assessment results to ensure the continued success of the statewide marketing and outreach program.

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During 2006, 2007 and 2008, research directed the campaign message strategy to focus on the concept of global warming. In 2009, this focus will shift to the financial benefits of reducing energy use, with less emphasis on global warming.

d) Target Audiences

General Market

EP's English-language residential campaign will utilize television (in Southern California only due to reduced funding in PG&E's service territory), radio and online advertising weighted toward a 25-65 year-old audience, skewed slightly toward higher income and women as the primary purchasers of energy-efficient products, and targeted toward the top market segments identified in EP's research in 2006-2008. Additionally, EP will target the English-language preference ethnic markets of Filipinos, Japanese, Asian-Indians and African-Americans.

EP will use Internet strategies, including its web site, to target the commercial, industrial, governmental, agricultural market segments.

EP will target the six pan-Asian segments (Chinese, Filipino, Korean, Asian Indian, Vietnamese, and Japanese) that account for over 90% of the overall Asian population in California. EP will use television, radio, newspaper and online, and the in-language web sites. The California audience that prefers to speak Spanish at home will be targeted through the use of Spanish-language radio and newspapers to augment Staples' Univision TV ad campaign.

Hispanic Market

Staples' Spanish TV campaign reaches out to the more than 25% of California's population who prefer to speak Spanish at home. The campaign's reach is statewide, with a focus on those urban areas with high concentrations of Hispanics. Though the target market is predominately 18-54 year-old, the campaign uses destination programming to focus on Hispanics who are homeowners and have incomes of \$50,000 and above. During 2009, the majority of the efforts will be concentrated in Southern California, with a reduced campaign in PG&E's service territory.

Rural Market

RS&E's rural market campaign will direct campaign efforts to rural, hard-to-reach homeowners living within IOU service territories. To facilitate this communication, RS&E will continue to use the most current zip code data available from the IOUs, which identifies and categorizes customers as both rural and receiving service from a participating IOU. Only those zip codes categorized as such will be considered for advertising coverage. It should also be noted that 2009 program efforts will be largely based in Southern California utility markets, with a reduced effort in PG&E's service territory because of funding priorities.

The rural residents we are targeting are described as rural, hard-to-reach residential IOU customers living in both single and multi-family homes. They are predominantly white, with Hispanics making up the largest non-English speaking minority.

Marketing, Education & Outreach

e) Elements of workforce education and training

Not applicable. With the exception of EP's online tools that include Best Practice Guides for various business sectors and downloadable Tip Cards which include workplace energy tips, this program will not include elements aimed at workforce education and training.

4.1 Program Rationale and Expected Outcome

Awareness of the FYP brand has increased annually and while most consumers agree that there is a link between household energy use and global warming, there is room for upward movement in this area. Ongoing education is imperative in changing attitudes and purchasing behaviors and creating social norms where communities and individuals act responsibly when it comes to saving energy.

a) Quantitative Baseline and Market Transformation Information

By its nature, market transformation occurs as a result of numerous factors, and can not be directly attributed to all program efforts. Market transformation metrics cannot be readily offered for this program at present.

Table 2.1 – Quantitative baseline metrics cannot be readily offered for this program

b) Market Transformation Information

By its nature, market transformation occurs as a result of numerous factors, and can not be directly attributed to all program efforts. Market transformation metrics cannot be readily offered for this program at present.

Table 3.1 – Market transformation metrics cannot be readily offered for this program

c) Program Design to Overcome Barriers

FYP is designed to overcome communication barriers by using a strategic mix of tools and tactics to reach the diverse California population. Though there is consistency in messaging, logo and referral to the FYP web site, campaign materials are also tailored to meet the unique cultural, language and media needs of respective target markets.

General and Ethnic Market: California is a massive state with multiple media markets, climate zones, cultures, attitudes and languages. It is diverse in the sectors that use energy, including nearly 70% being used by the non-residential sector. EP will use the most cost-effective and broadest reach strategies of television, radio and online to reach California's English-speaking residential population, targeting as closely as possible those segments most likely to purchase energy-efficient products and services. The non-business customers will be reached through more targeted strategies of the Internet.

The Pan-Asian, Spanish-language, and English-speaking ethnic groups who rely, some exclusively, on in-language TV, radio, online, newspapers and the Internet, will be reached through these communications in-language.

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An additional opportunity to maximize use of rate payer dollars stems from placing FYP media where it can be leveraged by the FYP Now (FYPN) campaign. FYPN has the challenge of alerting Californians on 24-hour notice to use less energy during peak times. By “switching-out” broad reach FYP media with FYPN messaging, costs can be dramatically reduced for FYPN, while still providing a highly-effective campaign. If messages are “switched out”, the FYP Campaign is compensated appropriately.

Hispanic Market: The Hispanic market poses several challenges. The primary challenge is language. This is addressed by using Spanish-language television and creating messages designed to reflect the unique cultural orientations of this market. Another significant barrier is the fact that approximately 50% of California’s Hispanic market has access to the web. FYP Spanish 2009 is designed to help Spanish-speakers who have web access flexyourpower.org and provide those Hispanics without web access alternative means of accessing information, programs and services. We will use targeted special events, editorial coverage and text messaging to reach the latter group.

Rural Market: During the 2006-2008 program years, it is estimated that there were more than three million people living in rural areas of 40 California counties. Rural residents are unique in that they often face extreme summer and/or winter climates and significantly greater electricity and/or natural gas requirements than do residents in urban areas. Experience has taught us that in the unique rural environment, it’s critical to accompany traditional marketing with more direct alternative communication methodologies, namely grassroots outreach. We have learned that while rural residents will also receive exposure from general market campaign components implemented by other marketing and outreach programs, they respond especially well to local-level communication.

d) Quantitative Program Targets

Table 4.1

Program Name	Program Target by 2009	Program Target by 2010	Program Target by 2011
General & Ethnic Markets of CA	<ul style="list-style-type: none"> • General Market: So. California TV/Radio 2,700 TRPs • General Market: No. California Radio 1,440 TRPs • Achieve 92,000,000 Impressions for Online Ads • Achieve 700,000 visits to FYP Web site • Achieve 330,000 page views to the utility and other energy efficiency programs in the rebate/program finder • Reach a 70% penetration level in the combined ethnic markets 	TBD	TBD
Hispanic Market	<ul style="list-style-type: none"> • Achieve 45,000,000 grps with TV schedule • Achieve 5,000,000 impressions with web portals • Reach 1,000,0000 people through special events 	TBD	TBD
Rural	<ul style="list-style-type: none"> • Recruit more than 300 CBOs. 	TBD	TBD

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Markets of CA	<ul style="list-style-type: none"> • Partner with up to 16 CBOs. • Reach at least 5 million people through CBO ads, earned media and special events. • Garner at least 75 million media impressions through print advertising and radio partnerships. • Write, translate and distribute Spanish-language press releases to more than 140 media outlets. 		
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e) Advancing Strategic Plan Goals and Objectives

The implementers believe their actions have been, and continue to be, in total alignment with the CPUC’s goals and objectives as stated in the Strategic Plan. The combined FYP campaign has, from the beginning, sought to make “energy efficiency a way of life.” The 2009 campaign will continue to transform Californian’s behavior so that their first inclination when buying a product or service is to look for the most energy-efficient option. Several motivations will be used, including saving money, helping the environment, and other social marketing messages. As in the past, the campaign will continue to direct residents and businesses to the IOUs, third-party and other energy efficiency programs.

There is always room for improvement, and this year’s campaign will refine its strategies and continue to integrate its efforts between the implementers and the IOUs.

5.1 Program Implementation

a) Statewide IOU Coordination

The FYP program implementers recognize the importance of coordination between marketing and outreach activities. Coordination and consistency can only enhance results achieved by everyone. Since all marketing and outreach efforts support the IOU and statewide energy efficiency programs, we recognize it is vitally important that the three statewide marketing and outreach contractors work closely with each other and continually share information to avoid duplication and maximize the value of their combined budgets.

To that end, the FYP implementers will:

- i. Utilize a consistent program name – or brand – FYP;
- ii. Coordinate marketing efforts whenever possible, especially media placement strategies, in order to avoid duplication;
- iii. Coordinate marketing messaging, including emphasizing the FYP web site;
- iv. Share marketing materials, including collateral;
- v. Continue to seek input from the IOUs, as well as coordinate timing and messaging with IOU marketing efforts where possible; and
- vi. Continue to post current IOU and other programs in a searchable format on the FYP web site, and promote them through searchable banner ads online.

b) Program delivery mechanisms

- i. **Funneling of program participants to resource programs** – Not Applicable, other than EP’s web site, which links to resource programs, provide product guides and other information.

Marketing, Education & Outreach

- ii. **WE&T** – Not Applicable.
 - iii. **Coordination with other programs** – Not Applicable other than EP’s web site which links to resource programs, provide product guides and other information.
 - iv. **Demand-side integration** – Not Applicable other than EP’s coordinated media buy with the Flex Alert campaign, and the ability to switch out efficiency advertising to Flex Alerts on a 24-hour notice.
 - v. **Non-IOU programs** –EP’s web site coordinates with and promotes all energy-efficient programs statewide, including those of third-parties, municipal utilities, water agencies and others, such as e ENERGY STAR®, which offer energy-efficient programs.
 - vi. **Other** – Not Applicable.
- c) **Marketing plan**
- i. **Market Research and/or Segmentation:** The FYP programs have been directed to eliminate market research during the 2009 program year as a result of budget reductions and a planned 2009 baseline survey effort of energy efficiency attitudes and behaviors. Market segmentation is based on research. To the extent possible, the program implementers will segment the market to target those individuals with the highest potential for making energy efficiency improvements, based on research conducted during the 2006-2008 program cycle. Additionally, all three FYP programs will conduct message testing in the form of focus groups for their summer media campaigns.
 - ii. **Proposed behavior change theories application:** The FYP campaign is based on accepted social marketing concepts similar to those used to sell products, but enhanced to facilitate the promotion of attitudes and behaviors. The starting point for construction of a social marketing campaign is getting to know the target audience through market research: its social and demographic makeup (economic status, education, age structure, etc.), its psychological features (attitudes, motivations, values, behavior patterns) and its needs. The statewide ME&O effort have done this kind of research throughout the campaign and will easily apply this knowledge to our 2009 effort, in message design, media selection, development of collateral materials and outreach activities.
 - iii. **Target Markets**
General and Ethnic Markets – EP’s English-language residential campaign will reach statewide, weighted toward a 25-65 year-old audience, skewed slightly toward higher income and women as the primary purchasers of energy-efficient products, and targeted toward the top market segments identified in EP’s research in 2006-2008. Additionally, EP will target the English-language preference ethnic markets of Filipinos, Japanese, Asian-Indians and African-Americans.

EP will use Internet strategies to target the commercial, industrial, governmental, agricultural market segments including the FYP web site, the E-Newswire, the FYP blog, etc. where award winners can be highlighted, studies can be shared and factoids and pertinent information can be included.

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EP will target the six pan-Asian segments (Chinese, Filipino, Korean, Asian Indian, Vietnamese, and Japanese) that account for over 90% of the overall Asian population in California. Again, the California audience that prefers to speak Spanish at home will be targeted through the use of Spanish-language radio and newspapers to augment Staples' Univision TV ad campaign.

Hispanic Market – The core target market is Hispanics who speak Spanish at home, ages 18-54, with a focus on homeowners with annual incomes of \$50,000 and above. Studies indicate that 25.8% of all Californians speak Spanish at home. Latinos, more than any other group, are also more likely to live in neighborhoods where the population is 50% or more Latino. The highest concentrations of Latinos are in the following counties: Orange, Ventura, Marin, Los Angeles, Stanislaus, San Mateo, Riverside, Fresno, San Bernardino, San Diego, Santa Barbara, Kern, Santa Clara, San Joaquin, Alameda, Contra Costa and San Francisco.

Rural Market -- The target audience for the rural effort consists of residents living in rural markets throughout California in the designated IOU service territories. Since homeowners tend to make the largest investment in their homes with regard to energy savings (home improvements, etc.), the demographic for this effort will skew slightly older, 35 – 64. However, since the issue of global warming resonates more with a younger audience, a secondary target market of 18+ will also be included.

iv. Message development – For the 2009 program year, all three FYP programs agree that message testing is vital to developing effective creative concepts and materials. Therefore, the programs will conduct message testing for each of their respective campaigns. Each implementer will also develop a creative brief, which will serve as a road map for ensuring that all campaign materials and messages are well coordinated.

v. Delivery Channels – Program implementers will utilize a variety of channels to deploy campaign messages.

General and Ethnic Market –

1. English language television (including cable)
2. English language radio
3. English language online
4. Spanish language TV (only for Flex Alerts if supported by IOUs and CPUC)
5. Spanish language radio
6. Spanish language newspaper
7. Spanish language online ads
8. Chinese language TV
9. Chinese language radio
10. Chinese language newspaper
11. Chinese language online ads
12. Vietnamese language TV
13. Vietnamese language radio

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14. Vietnamese language newspaper
15. Vietnamese language online ads
16. Korean language TV
17. Korean language radio
18. Korean language newspaper
19. Korean language online ads
20. African-American newspaper
21. Filipino newspaper
22. Asian-Indian newspaper
23. Japanese newspaper
24. Internet (web site and other Internet tools)

Hispanic Market –

1. Spanish-language television networks
2. Spanish-language web advertising
3. Interviews on Spanish-language TV talk shows and news programming
4. Special events targeted at Hispanic communities
5. Fotonovela and informational slide guide distribution
6. Text messaging pilot program

Rural Market –

1. Community based outreach through partnerships with organizations that will disseminate campaign messages at the local level;
2. Several pilot programs designed to expand community outreach efforts, including a partnership with a health organization, Hispanic organizations and an urban market organization;
3. Traditional media, including a print and radio campaign;
4. Hispanic public relations and outreach effort;
5. Collateral development to support outreach efforts; and
6. Fotonovela to support Hispanic outreach efforts

vi. Message Concepts – The FYP implementers have met with the ME&O Task Force to discuss direction for 2009 campaign messages. In 2009, we will focus primarily on the specific measures consumers can take to save energy and money, while incorporating global warming to a much lesser extent than was done in 2007 and 2008. The IOUs will direct us to specific measures for emphasis.

vii. Implementation Timeline

- Contracts are finalized – January
- Media runs – January-February (winter campaign)
- Web site content developed and posted; Web site hosted -Ongoing
- RS&E recruitment of CBOs – January/February
- Creative development (including review) begins – January/February

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- RS&E to train CBOs – March
- Message testing – March/April
- General and ethnic market and Hispanic broadcast/print production – April
- Media runs – June – September (summer campaign)
- Final Reporting – October – December

d) Best Practices

The 2009 FYP program is based on the lessons learned since the beginning of the program. Evaluations were done of the 2001–2002 campaign during the energy crisis, and then after the 2004-2005 program cycle. Draft findings of the evaluation of the 2006-2008 program cycle were also recently published. Additionally, input has been sought and incorporated from other social marketing and other campaigns, professionals and manufacturers and retailers of energy-efficient products.

Best practices for program implementation include:

- i. Altering 2008 creative to respond to 2009 market conditions, particularly the economic downturn;
- ii. Achieving greater impact by targeting market segments with the highest potential for making energy efficiency improvements; and
- iii. Establishing www.FlexYourPower.org as a central clearinghouse for energy efficiency information, programs and resources

e) Innovation

The FYP programs are using a variety of new, innovative strategies and tactics to maximize reduced budgets in 2009. Some of those innovations include:

- Refine Online Marketing Channels:
 - Dynamic banner campaign
 - Search Engine marketing (behavioral targeting, contextual targeting and retargeting);
 - Widget Applications - Rebate Finder
 - RSS Feeds
 - Explore integration of Rebate Database with eCommerce site
 - Explore building comprehensive tools to facilitate energy-savings. (i.e. ROI calculator, Energy-Savings calculators, Equivalency calculator, Energy-efficient Appliance Finder)
- More targeted ads to smaller market segments (cable TV; radio; online)
- Spanish language text messaging project
- Spanish language “slide guide” to help audience access DSM programs
- Greater use of Spanish online
- Development of a fotonovela
- Coordination of Univision special events with rural CBOs and IOUs
- Expansion of the rural market CBO program, including partnerships with health organizations, as well as Hispanic organizations
- Piloting a partnership with an urban market CBO

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f) Integrated/coordinated Demand Side Management

Not Applicable other than EP's Flex Alert campaign if approved by IOUs and CPUC.

g) Integration across resource types

Not Applicable other than EP's promotion of all energy efficiency programs, and cross-marketing with water efficiency programs.

h) Pilots

General and Ethnic Market – EP will continue developing its Internet-based web site and advertising tools (some listed above).

Hispanic Market – Staples is partnering with Azteca America in a pilot project to reach Spanish-speaking Californians through an opt-in text messaging program. The program will deliver energy-saving and motivational messages, connect users to www.FlexYourPower.org and allow for tracking.

Rural Market –RS&E will test programs in an effort to find new ways to expand outreach in the rural communities, including funding a health care organization and Hispanic groups to advance energy efficiency. And in response to a recommendation made in Opinion Dynamic Corporation's process evaluation, RS&E will pilot an urban organization partnership, with the goal of expanding even further in the 2010 program year and beyond. RS&E is also planning to launch a fotonovela project to reach Spanish-language groups. Its distribution will be conducted by both Staples and RS&E at community events and through RS&E's Hispanic media partnerships.

i) EM&V – To the extent possible, each program implementer will provide measurement and verification of marketing efforts conducted during the 2009 program year, including media reach and frequency numbers, media impression numbers, affidavits of media placed, outreach materials collected including contact information, collateral distribution lists, event and outreach event lists, etc.

3.2 Subprogram – Strategic Plan Implementation

a) Program Description

In alignment with the Strategic Plan, branding, segmentation and social marketing activities will be key components of both the assessment/creation of California's new DSM brand and implementation of a statewide marketing and outreach plan. The results will inform the CPUC's decision regarding the future direction of statewide marketing and outreach, which could involve continuing with or broadening the scope of the current statewide marketing and outreach program, or launching an entirely new DSM brand for California in years 2010-2011.

The Commission-established ME&O Task Force will continue to serve in a strategic advisory capacity to guide the implementation of the strategies proposed in the ME&O Strategic Plan. The ME&O Task Force will continue to seek input from the utilities, sector leads, marketing and branding experts, other state agencies, and key stakeholders to ensure successful implementation of the Strategic Plan's ME&O strategies.

4.2 Program Rationale and Expected Outcome

The most basic and pervasive opportunity for utilities to influence energy efficiency behavior is in the home. Changes in understanding and attitude regarding home energy use are likely to influence the consumer's choices and actions at work and in their community.

Global warming is a real and perceived threat². A majority of Californians are aware of climate change and believe that its impacts are occurring now and will increase in the future, yet many still do not understand how they can take action to reduce their carbon footprint. The motivation to reduce personal GHG emissions creates an opportunity for acceptance of energy efficiency solutions that was not readily available in past energy efficiency program cycles.

Research indicates that three out of four Californians have a desire to participate in energy conservation³. Our challenge in the short and long-term is to drive statewide participation at the level necessary to achieve the vision and goals of the Strategic Plan.

A review of ME&O discussions by the market sectors involved in the strategic planning effort indicates that specific, credible and appropriate action guidelines are essential to increasing participation in EE programs in all sectors. The target audiences for each of these sectors will need to be educated on energy efficiency and DSM options by utilizing the best practices of marketing and advertising, including social and behavioral marketing.

The foundations of the ME&O strategies proposed in the Strategic Plan are built on six major themes:

Integrated Marketing

Maximizing energy savings and changing consumer behavior requires an integrated marketing effort involving all stakeholders with responsibility for energy efficiency in all sectors. An effective marketing effort will move consumers through a continuum from awareness, to attitude change, to action. Consumers must be presented with the full array of DSM programs, products and services in a manner that understandable, sensible, and clearly shows the maximum benefits to the customer.

Social Marketing

Unlike mainstream marketing, which is designed to promote purchase of a specific product, energy conservation often has invisible or intangible benefits to a consumer. Moreover, the pursuit of energy efficiency may require sustained efforts by the consumer, both in gaining information and implementation. The techniques of social marketing –the use of marketing tools to achieve specific behavioral goals for a social good – offer the means to motivate consumers to make a long-term commitment to change.

² December 2007 Global Warming Study - Fraser Communications

³ Statewide FYP 2007 Tracking Study – Hiner & Partners, Inc.

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To realize this potential, marketing messages must be developed in the context of increased understanding of a diverse public. This includes an examination of current terms such as ‘energy efficiency’, ‘demand response’, ‘climate change’, ‘green’, ‘photovoltaic’, etc. in order to determine what does and does not resonate with consumers. The insights gleaned from this analysis will help to shape targeted messages that are clear, relevant and actionable.

Additionally, a behavior-based marketing approach that provides customers with an indication of how their individual energy use fares comparatively will be explored in parallel with social marketing, as a potential motivator for behavior change.

Branding

The impact of marketing efforts can be increased if all actions and messages are consistent across all messaging sources. A clearly-defined brand can provide a single point from which expanding, concentric circles of communication and influence can emanate. Clarity and precision in defining a statewide brand is essential. Managing a brand is equivalent to managing an asset, and the funds that are invested in a brand must be effectively managed going forward.

The term “brand” is not meant to solely connote a logo, tag line, or name, but rather “a collection of perceptions in the mind of the consumer.”⁴ Clear delineation of what the California energy brand encompasses is instrumental to the development of unified messages and actions that bring consensus and alignment. Given the complexity of the market that is being addressed, and the range of programs and organizations that could potentially fall under a statewide energy brand, this subject requires (and deserves) intensive study.

Technology

Technology continues to evolve at a rapid pace, creating new opportunities for disseminating energy efficiency information to consumers. Californians are quickly moving beyond their television screens and newspapers into a digital world that offers multiple platforms for information exchange. Handheld devices, PDAs, laptops, and cell phones are now the cultural norm, potentially providing viable ‘portable’ mediums for delivering real-time EE information to consumers.

Next generation ‘smart meter’ technology is poised to transform the market by allowing customers to proactively manage their energy use and save money. Through the integration of home networks and wireless, ‘smart home’ technology will enable everyday electronics and household appliances to communicate with each other, the consumer and the manufacturer.

The Internet offers tremendous, cost effective opportunities for creating and maintaining an ongoing EE dialogue to promote behavior change. In concert with this ME&O strategic plan, further study will be devoted to developing a statewide DSM web portal that serves as

⁴ Presentation made to the ME&O Task Force on January 3, 2007.

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one integrated point of access to a multitude of information on energy efficiency, GHG reduction and DSM options and can direct customers to local utility programs. The web portal will be a user-centered, interactive resource that allows on-line visitors to easily navigate multiple points of data, applications, and information systems. In light of the growing popularity of social networking sites such as Facebook, YouTube, and MySpace, the opportunity for the web portal to include social networking components to engage a younger audience in adopting long-term energy efficiency behavior will be explored in parallel with this effort.

In addition, new media offers another channel in which to convey energy efficiency messages. New media will be an integral component among the mix of delivery channels that will be developed pending segmentation research and analysis of which target audiences would more likely to act on energy efficiency from this delivery channel.

Demography

Shifts in California's demography indicate that by the year 2050, more than half of all Californians will be Latino⁵. Studies also show increasingly high levels of concern about global warming, air pollution, and air quality. Concern and awareness are particularly high in minority/low income communities, as these communities are disproportionately affected by air quality issues.

In low-income areas where many minority communities are concentrated, more than 30 percent of total household income is used to pay for necessities such as rent, utilities and maintenance. Income constraints limit their ability to take on additional costs. It is imperative that ME&O efforts offer customized, cost-effective solutions that will increase participation in California's statewide energy efficiency, and demand response programs among growing minority populations.

ME&O must include approaches that are based on an understanding of the differences in cultures. For example, all marketing and educational campaigns should include competent and 'in-language' DSM solutions with appropriately shaped messages to maximize program participation, market transformation and long-term EE behavior adoption. Beyond the message itself, a campaign should consider the most relevant vehicles for delivering the message.

California's long-term plan for energy efficiency must provide targeted, customer-focused DSM programs that fully leverage the rapidly changing demographic and technological landscape.

Global Warming Awareness

⁵ Data from California Department of Finance as presented in *Greening the Color Line: Changing Demographics, Changing Attitudes on the Environment in California's Low-Income and Minority Communities* by Christian Gonzalez-Rivera-Consultant, Housing, Land Use, and Demographics.

Marketing, Education & Outreach

Although a majority of Californians are aware of climate change and believe it is occurring now and will continue into the future⁶, many do not understand how they can take action to reduce their carbon footprint or the connection between home and business energy use and carbon emissions. Energy efficiency outreach campaigns need to clearly inform consumers about the connection between home and business energy use and how energy efficiency actions reduce GHG emissions.

a) Quantitative Baseline and Market Transformation Information

By its nature, market transformation occurs as a result of numerous factors, and can not be directly attributed to all program efforts. Market transformation metrics cannot be readily offered for this program at present.

Table 2.2 – Quantitative baseline metrics cannot be readily offered for this program

b) Market Transformation Information

By its nature, market transformation occurs as a result of numerous factors, and can not be directly attributed to all program efforts. Market transformation metrics cannot be readily offered for this program at present.

Table 3.2 – Market transformation metrics cannot be readily offered for this program

c) Program Design to Overcome Barriers

Energy efficiency is an intangible entity and as such, consumers do not immediately recognize the long-term benefits associated with investment in energy efficiency products and services. A paradigm shift for energy efficiency is needed to transform consumers short-term desire for immediate savings into a mindset where an investment in energy-efficient products, services and behavior becomes the norm.

Because consumers feel they are already doing all that they can to save energy, convincing them that they can do more is a significant barrier to participation. Key to overcoming this barrier will be for consumers to feel that they are in control of their energy use and to offer them holistic DSM choices that drive participation and long-term behavior change. Consumers need to feel that their individual contributions matter and that together, we can solve the environmental challenges that face us as a state and as a nation.

The ME&O strategic plan's foundational activities are uniquely designed to address and overcome these barriers to participation. The development of a recognizable and trustworthy brand for California, segmentation analysis, behavior/attitudinal research, and message development will provide a framework for customers to better understand and participate in energy efficiency and conservation behavior. Targeted, relevant messages that are firmly rooted in an understanding of the various demographic, psychographic and cultural differences that comprise California's diverse population will be deployed. Behavioral/attitudinal research will be undertaken to identify additional motivators that drive permanent behavior change. A statewide, 'best-in class' web portal will be

⁶ Source: *Californians and Their Attitudes Toward Energy Efficiency and Global Warming* presented by Fraser Communications. December 2007.

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developed to allow energy efficiency practitioners and consumers to exchange information and solutions on implementing energy efficiency programs and measures.

d) Quantitative Program Targets

Table 4

Program Name	Program Target by 2009	Program Target by 2010	Program Target by 2011
Target #1	N/A	N/A	N/A

e) Advancing Strategic Plan goals and objectives

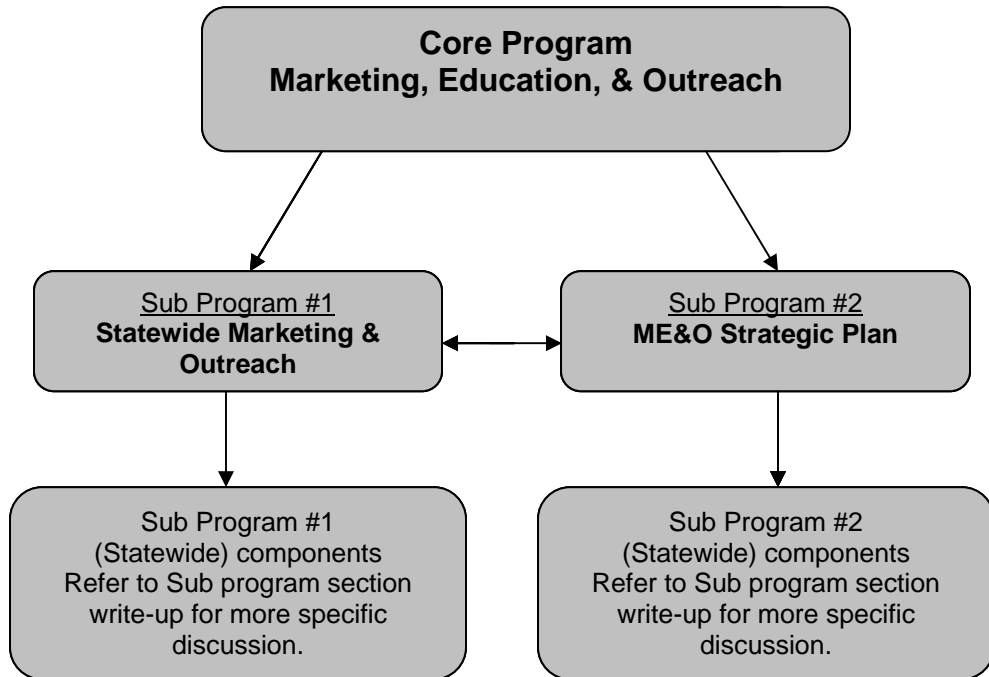
The Strategic Plan recommends four exploratory activities that are necessary to achieve California's energy efficiency goals for 2009 and beyond. These activities will be guided by the ME&O Task Force, whose members include both IOU and CPUC representatives and as appropriate, other professionals with specific marketing/branding expertise. Funding required to support these activities is sourced from a reduction to the ratepayer funded 2009-2011 Statewide ME&O campaign (FYP) program budget.

- Explore the use of a recognizable and trustworthy Brand for California's Energy Efficiency and other DSM Consumer Products and Services. A branding expert will be enlisted to assess the existing equity in the current energy statewide brand to determine if it should be continued, expanded in scope, or whether a new DSM brand for California should be implemented. A key part of the brand assessment will include evaluating whether it will be desirable and possible for such a brand to also encompass related initiatives such as California Solar Initiative and the Global Warming Solutions Act implementation.
- Utilize statewide segmentation research to develop targeted and highly relevant energy efficiency and DSM marketing messages to incite behavior change/action. Statewide segmentation research will be conducted to better understand the attitudinal, behavioral, demographic and psychographic differences that comprise California's diverse population. Additionally, terminology commonly associated with energy efficiency/conservation will be evaluated so that marketing messages are constructed to be simple, clear, relevant and actionable.
- Use social marketing techniques to build awareness and change consumer attitudes and perceptions. Social and behavioral marketing approaches that provide consumers with an emotional reason to permanently adopt energy efficiency and conservation behavior will be explored.
- Explore developing a website with Statewide Information on GHG reductions, energy efficiency and DSM awareness and options. In support of the Strategic Plan, a 'best in class' statewide energy efficiency/DSM web portal will be developed that will be used to engage private industry and business in DSM. Initial development efforts will be geared to the energy efficiency/DSM industry and policy makers.

5.2 Program Implementation

N/A. The Strategic Plan Implementation sub-program supports the statewide Marketing and Outreach sub-program.

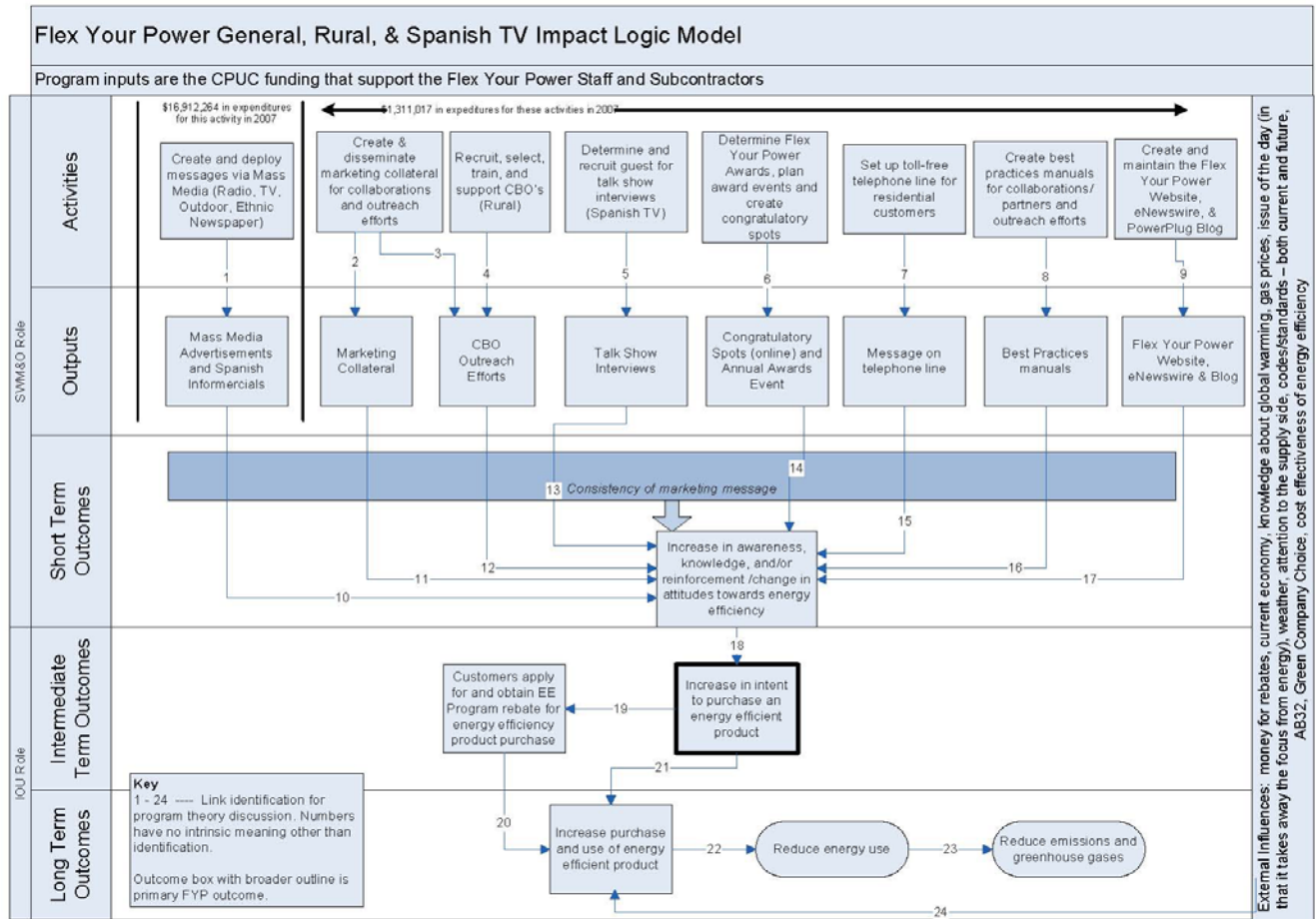
6. Diagram of Program



Marketing, Education & Outreach

7. Program Logic Model:

There have been no changes to the logic model depicted in Opinion Dynamic's process evaluation report on the 06-08 ME&O efforts. Recently, a new implementer has been contracted to deliver the 09-11 ME&O FYP program; any changes to the logic model made by the new implementer will be communicated to the CPUC as soon as possible.



(From "2006-2008 Statewide Marketing and Outreach Process Evaluation", p. 34, Opinion Dynamics Corporation, 2008)

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Integrated DSM

1. **Program Name:** Integrated DSM
Program ID: SCE-SW-012
Program Type: Core

2. **Projected Program Budget Table**

Table 1

SCE-SW-012	Main Program Name / Sub-Program	Total Administrative Cost (Actual)	Total Marketing & Outreach (Actual)	Total Direct Implementation (Actual)	Integration Budget Allocated to other Programs (If Applicable)	Total Budget By Program (Actual)
CROSSCUTTING						
	Integrated DSM	\$ 1,264,000	\$ -	\$ -		\$ 1,264,000
	TOTAL:	\$ 1,264,000	\$ -	\$ -	\$ -	\$ 1,264,000

3. **Program Description**

- a) **Describe program**

The California Long Term Energy Efficiency Strategic Plan (Strategic Plan) encourages programs that integrate the full range of demand-side management (DSM) options: energy efficiency (EE), demand response (DR), and distributed generation (DG) as fundamental to achieving California’s strategic energy goals. This PIP presents the coordinated effort that the IOUs will make in full collaboration with the CPUC Energy Division.

The IOUs have identified integrated DSM (IDSM) as an important priority. In the IOUs’ 2009-2011 EE applications, each IOU has included separate exhibits on IDSM as well as specific integration activities within each PIP at the statewide and local program level, as instructed by the CPUC. In addition, each IOU has proposed individual series of activities, pilots and other programs in response to the Strategic Plan’s DSM Coordination and Integration Strategy. Through all of these approaches, IDSM will be advanced in significant ways.

In addition to each IOU’s individual IDSM activities and pilots, the IOUs are proposing a statewide IDSM effort that will establish a Statewide Integration Task Force (Task Force). Efforts of the Task Force will encompass activities that promote in a statewide-coordinated fashion two specific IDSM strategies identified in the strategic Plan, i.e., stakeholder coordination (Strategy 1.3) and new technologies (Strategy 1.4). The IOUs believe that Strategy 1.1—“Carry out integrated marketing of DSM opportunities across all customer classes,” should be coordinated with the statewide Marketing, Education and Outreach efforts (see ME&O PIP) and implemented at the local level by the IOUs focused on particular segment and customer-specific strategies. The Task Force will coordinate closely with the Marketing and Outreach statewide team to ensure a consistent approach and the gain knowledge from statewide and local marketing and outreach efforts.

Integrated DSM

The budget is intended to cover costs of a full time resource at each IOU who will lead internal task forces and represent the utility at the Statewide Task Force level and to support time spent by subject matter experts and associated expense within each IOU.

Budget \$1.2 million per year (\$3.6 million over three years) allocated as follows:

PG&E:	\$1.2 million
SCE:	\$1.2 million
Sempra (SDG&E/SoCalGas):	\$1.2 million

b) Statement of problem and solutions to overcome barriers

There is a significant focus on integration on a statewide and local level by customers, utilities, regulators and legislators.

The CPUC's Strategic Plan provides its vision that "energy efficiency, energy conservation, demand response, advanced metering, and distributed generation technologies are offered as elements of an integrated solution that supports energy and carbon reduction goals immediately, and eventually water and other resource conservation goals in the future." In addition, the State Legislature has proposed Assembly Bill AB 51, which will require the CPUC to integrate the DSM programs within its jurisdiction in order to enable offerings of integrated packages that will maximize savings.

In order to ensure that the medium- and long-term vision of IDSM is maintained and kept moving forward, the IOUs, in collaboration with the Energy Division, propose the formation of the IDSM Task Force. The Task Force will meet regularly to identify and promulgate best practices, identify implementation and policy issues, design effective metrics to measure progress on IDSM, and report to the CPUC.

This Task Force does not replace individual IOU governance of programs and is not intended to duplicate activities. Rather, the Task Force will look for important opportunities, identify barriers, and work through the program staff to promote the advancement of IDSM, lessons learned and best practices. Specific activities that the Task Force will focus on include the following:

- **Propose a cost effectiveness methodology for IDSM programs and projects.**
At present, the state has the Standard Practice Manual that describes various cost effectiveness tests for EE programs. The CPUC has an approved cost-effectiveness methodology for EE programs. The CPUC also, in R.07-01-041, is considering cost effectiveness methodologies for DR programs. There are currently no standard cost effectiveness methodologies to evaluate Solar (CSI) and DG programs. A cost-effectiveness methodology needs to be developed for these programs and projects that consider how costs and benefits are calculated for integrated projects & programs that seek to combine all these demand side resource options simultaneously. The Integration Task Force would coordinate a workshop to gather stakeholder feedback on this issue.

Integrated DSM

- **Propose measurement and evaluation protocols for IDSM programs and projects.** Similar to the issue of cost-effectiveness, the CPUC has approved M&E protocols for EE programs. However, in order to effectively evaluate IDSM programs, activities and pilots, specific protocols need to be developed so that all energy savings and demand reductions from various DSM customer activities are properly documented. The Task Force will coordinate with the EM&V group to develop a proposal of appropriate metrics for assessing integration.
- **Tracking integration pilots, programs and activities.** The Task Force will track integrated efforts and use **standards** developed to evaluate their success. The Task Force could then use this as a basis to identify pilots, programs and activities that might be replicated in other parts of the state. Part of this effort will include utilizing new integrated audit tools being developed by IOU market sector programs that provide baseline data and information regarding appropriate combinations of DSM technologies for a site. In turn, the IDSM taskforce will coordinate with market sector efforts to provide feedback on the development of these tools to ensure they are truly integrated. Although the Task Force will not run or manage programs, it will offer recommendations, based on its findings, on new approaches and activities that may be added to existing programs to enhance the integrated nature of these offerings. The IOUs are proposing resources for this activity and envision devoting both management and analytic time to this process.

In addition to the formal Task Force, the IOUs will establish, with the Energy Division, a group of dedicated analysts who will be the liaison between the Task Force and the various Zero Net Energy (ZNE) pilots. The analysts will actively participate in discussions of the pilots, perform assessments based on data collected from the pilot program managers, and return recommendations to the management-level staff of the Task Force. The Task Force will establish a regular review process for pilot progress and ensure that best practices are identified in a report and shared with portfolio managers for all EE areas and Energy Division staff. IDSM can be made a regular agenda item of regular management reviews within each IOU and can be shared with the other IOUs.

- **Review of New Technologies:** The CPUC has also approved various R&D and Emerging Technologies (ET) programs that review technologies that could promote IDSM. The Task Force will be a venue to discuss **the** applicability of these new technologies and initiatives in the context of IDSM. Task Force members are currently participating in the ET process in order to identify and promote technology that can integrate across programs.
- **Development of Best Practices:** As the IOUs are conducting IDSM pilots and continued research is shared, the **Task** Force will also look at developing best practices for future IDSM **programs**. The Task Force will establish a formal process for sharing **best** practices with internal IOU staff, energy division staff and interested stakeholders.

Integrated DSM

- **Development of Regular Reports on progress and recommendations to the CPUC.** The Task Force will develop regular reports on efforts to provide to the CPUC the tracking activities and efforts to **date** and plans going forward.
- **Establish Strategic Planning Function** The Task Force will be used as a strategic planning source to help inform internal staff development of integrated programs. At present, all IOUs have **established** a strategic planning function within EE and have established or will be establishing internal Integrated Teams with representatives from staff of different groups across the companies, including EE, DR, DG/CSI, green programs, and marketing and delivery channels. This strategic planning function will work across all EE and other DSM areas to ensure consistency and integration, and that the short and mid-term actions of the IOUs meet the long-term goals of the Strategic Plan. The Task Force is being staffed by the same people who are now doing strategic planning and leading the internal integration teams.
- **Use of Task Force assessments and findings in the IOUs' integrated marketing campaigns.** Regular meetings are already established to review EE results with internal marketing management and discuss course changes that might be needed. The exact process of feedback will be determined, but the Task Force can, for example, forward **its** recommendations to EE management for use in regular reviews and reports in addition to ad hoc contacts to plan and modify programs. At the meetings, the Task Force can also use the opportunity to educate and train management and portfolio managers on the latest findings on better ways to integrate DSM.

c) Program goals, strategies and measurable objectives

The primary purpose of the Task Force is to establish a blueprint for integration for California. To achieve this purpose the Task Force will pursue several objectives:

- Determine membership and identify key liaisons and stakeholders. Initial Task Force membership will include representatives from each of the utilities and from the Energy Division of the CPUC. Utility membership will include people representing strategic planning, EE, DR and DG programs, as well as ET, marketing, delivery channels and regulatory coordination. Depending on each utility's internal integration coordination process, members of the statewide utility Task Force are more likely to represent larger internal utility integrated teams. Statewide membership may be expanded to include representatives from the municipal utilities, the CEC and other stakeholders as deemed useful by the initial members.
- Identify and describe progress to date and current programs related to:
 - Existing utility activities, efforts, programs and pilots;
 - IDSM best practices; and
 - IDSM metrics and cost effectiveness methodologies.

Integrated DSM

- Identify key issues affecting successful integration and develop a timeline and structure for prioritizing identified action items.

The Task Force will identify key issues that affect the successful integration of DSM measures in utility programs. At a minimum, key issues include cost-effectiveness, customer barriers to integration, enhancing progress on technical innovations and regulatory jurisdictional issues. The Task Force will work with ET and program planning staff to develop potential solutions to the issues raised, and then follow through to see that the solutions are represented in future program modifications. Task Force meetings can include a specific timeline and structure to track progress on identifying and deploying solutions.

- Develop metrics and reporting mechanism for tracking success of integrated efforts (EM&V protocols).
 - Develop proposals for policy and program initiatives necessary to forward IDSM.
 - Establish program-funding protocols.
 - Identify and recommend adoption of enabling/supporting policies for inclusion in appropriate DSM programs.
 - Identify and propose changes to inhibiting policies and metrics.

d) Target audience

The target audience for this program consists of IDSM stakeholders including, but not limited to, utilities, CPUC, CEC, and IDSM service providers.

e) Identify if and how this program will provide any elements of WE&T

This program will create information useful to WE&T, but will not have any formal connection. The Task Force can be utilized as a repository of experts and best practices that promote IDSM for IDSM-related WE&T efforts.

4. Program Rationale and Expected Outcome

The Strategic Plan calls for an ongoing task force to establish a blueprint for integration. A statewide non-resource program is an effective means of coordinating such a blueprint.

a) If available, Quantitative Baseline and Market Transformation Information

The IOU Task Force will track integrated projects and activities and will begin to identify areas where integrated projects are beginning to be part of a successful customer approach. An IOU-sponsored process evaluation will be designed and initiated in order to formalize tracking efforts and establish a basis for determining the efficacy of various integration approaches.

b) Market Transformation Information

The Task Force will work closely with the program leads, ET group, marketing team, WE&T and EM&V teams to identify projects and approaches and to develop models and training that will lead market transformation. The IOUs are committed to

Integrated DSM

supporting progress in achieving market transformation by growing the approaches, programs and training options that target integrated offerings.

c) Program Design to Overcome Barriers

As stated in Section 8, (Page 72) of the Strategic Plan, “Historically, demand side management (DSM) options for energy consumers have been 'siloed' activities within regulatory bodies, utilities, environmental organizations, and among private sector service providers. . . . The current narrow focus on a single product offering does not maximize energy savings nor minimize the costs of program delivery.” The Task Force and associated integration efforts within each utility are working to overcome these barriers and be more “customer centric,” rather than “program centric” in our approach.

d) Quantitative Program Targets: N/A

e) Advancing Strategic Plan Goals and Objectives

This program is specifically intended to address the near-term action item to establish an ongoing working group.¹ See the Strategic Plan Crosswalk Matrix for more details.

5. Program Implementation

a) Statewide IOU Coordination This is a statewide program.

i. Program Name: Integrated DSM

ii. All program delivery mechanisms: N/A

iii. Marketing materials and message: N/A

iv. IOU program interactions with CEC, ARB, Air Quality Management Districts, local government programs, other government programs, CBOs, non-governmental organizations, manufacturers, retailers, trade and business associations, as applicable.

This program does not interact, per se, with other programs or organizations. However, information from other organizations and programs will be used in the program. Future program milestones, lessons learned, and best practices can be shared with outside stakeholders to further IDSM activity outside of IOU programs.

v. Similar IOU and POU programs: N/A

b) Program delivery mechanisms

The Task Force will not be involved in direct implementation

Integrated DSM

c) Marketing plan

The Task Force will not be involved in direct marketing, but marketing will be an integral part of integrated approaches included in each individual approach. In addition, the Integration Task Force will work with the Statewide Marketing and Outreach team to leverage statewide awareness and education efforts directing customers to utility local integration efforts and offerings.

d) Best practices

The Task Force's involvement in reviewing utility integration activities, pilots and practices (e.g., ZNE, Food Processing), will lead to an establishment of integrated Best Practices.

e) Innovation

The context of this PIP and effort is entirely innovative in that this statewide effort has not been undertaken before by the IOUs. However, the individual utilities are currently working on integrated approaches locally to meet customer needs on a comprehensive, solutions-based level.

f) Integrated/coordinated Demand Side Management

The basis of this program is entirely integrated and coordinated demand side management on a statewide basis, with local efforts feeding into the overall strategy.

g) Integration across resource types

Where possible, the Task Force will identify opportunities for integrating across non-energy areas. Most likely, this information will come from pilots and other customer-focused activities and will be considered future pilots and best practice recommendations.

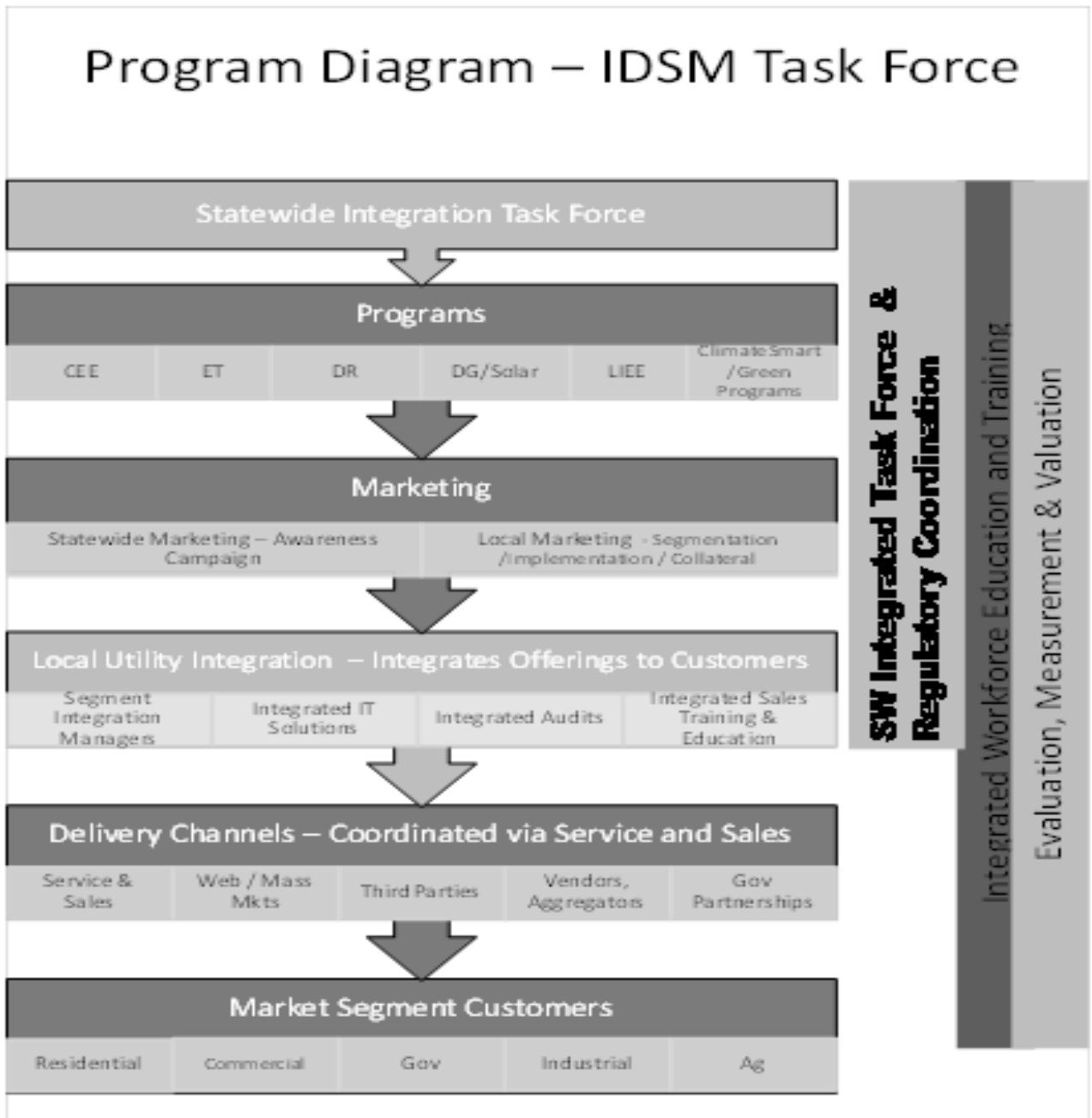
h) Pilots

Integrated pilots that the utilities will be reviewing as part of this process are included in individual utility applications in their integration PIPs and chapters.

i) EM&V N/A

¹ California Long Term Energy Efficiency Strategic Plan, Section 8, page 73 (Strategy 1.3).

6. Diagram of Program



7. Program Logic Model

N/A