California Public Utilities Commission

*Transmittal Letter for the:*

# 2010-2012 Energy Efficiency Evaluation, Measurement and Verification Work Plan

Version 1
December 20, 2010

California Public Utilities Commission
Energy Division
San Francisco, California

Transmittal Letter for the

# 2010-2012 Energy Efficiency Evaluation, Measurement & Verification Work Plan

December 20, 2010
CPUC Energy Division

Dear Energy Efficiency stakeholders,

We are pleased to provide you with Version 1 of the 2010-2012 Energy Efficiency Evaluation, Measurement & Verification Work Plan, which describes our plans for conducting over $90 million of ratepayer-funded evaluation and research.

As you review this document, we would like to bring a few factors to your attention. Most importantly, this plan - including the research and evaluation project proposals, budgets, and project management assignments – is a living document. The CPUC, in coordination with the IOUs, will refine and update it periodically based on input from stakeholders and needs that derive from the dynamic energy efficiency program, policy and evaluation environment. Further, while this plan is comprehensive, it is only a starting point. Projects highlighted here will be scoped in detail and contracted on a rolling forward basis for execution (and, in fact, some evaluation and research work described in this work plan has already begun).

We invite your thoughts and comments on Version 1 of the plan in writing by January 12[1], 2011, at a workshop we will hold on January 14, and, on future versions, throughout the 2010-2012 program cycle. The structure for ongoing public review and input on this evaluation work is presented in Section 11 of the document. However, the attached Version 1 of this work plan is not a draft. While we will update it, as noted above, we do not expect to hold off on its implementation while feedback comes in or to formally answer written stakeholder input as has been our practice with EM&V reports.

You will notice that the research objectives addressed in this plan, and the allocation of resources among them, are significantly more diverse than in past years to respond to the *California Long-term Energy Efficiency Strategic Plan* and other new policy directives. For example, while continuing to fund impact evaluation, more emphasis is now being placed on program implementation and adoption effectiveness. We have also added market assessment studies and several other new types of research.

Lastly, we note that we prepared this plan with input from the evaluation staffs of the IOUs who administer the $3.1 billion 2010-2012 ratepayer funded portfolio of energy efficiency programs. We appreciate their insights and input and look forward to continuing to work closely with them to implement this plan.

[1] Instructions for uploading comments to the Public Documents Area were included in the notice that accompanied the release of this plan to the appropriate CPUC service lists. If you need a copy of those instructions, please email JL2@cpuc.ca.gov or FAR@cpuc.ca.gov

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# Table of Contents

## List of Figures

## List of Tables

# 1

# Introduction

This evaluation plan for the Investor Owned Utilities' 2010-2012 energy efficiency programs expands on Energy Division's past energy efficiency evaluation work both in its objectives and its administration. This plan implements the five core evaluation and research objectives set forth in September 2009 in D.09-09-047:

1. *Savings Measurement and Verification*

2. *Program Evaluation*

3. *Market Assessment*

4. *Policy and planning support*

5. *Financial and Management audit*

This broadening of the scope of the evaluation supports the strategic nature of the new 2010-12 portfolio of energy efficiency programs, which is guided by the *California Energy Efficiency Strategic Plan*, and its emphasis on market transformation, and comprehensive approaches to energy savings. Meeting these broader objectives will also help the California Public Utilities Commission build a growing body of research and knowledge to support future program innovations and the work of other state agencies, including the California Energy Commission and California Air Resources Board, while supporting the Energy Division's critical oversight role of the ratepayer funded energy efficiency programs.

In developing the 2010-2012 Evaluation, Measurement & Verification Plan, the EM&V planning team sought to create a plan with the following characteristics:

- A focus on a set of high-level, strategic objectives
- Flexibility to anticipate and adjust to changing needs
- A balance of proven and innovative studies

In order to meet the CPUC's EM&V objectives, this plan, as reflected in the proposed research projects and budget allocations:

- Provides significant resources for process evaluations and implementation effectiveness assessments;
- Provides for a variety of market studies, including studies of the uptake of specific measures, as well as the behavior of market actors;
- Provides extensive resources for continued in-depth research on the impacts of energy efficiency measures, programs, and portfolios;
- Focuses on portfolio-level analysis of costs, impacts, and management processes with the goal of improving portfolio cost effectiveness;
- Pilots an experimental design evaluation of a behavior-based program to test the usefulness of the random sampling approach in energy efficiency evaluation and the success of that specific behavior-based approach in saving energy;
- Pilots macro consumption modeling as a means to assess trends in energy consumption in California, as a complement to the rigorous, measure-based impact evaluation; and
- Provides the necessary resources for Energy Division's oversight, reporting, potential and goals development, and strategic planning responsibilities related to energy efficiency EM&V.

This evaluation plan allocates $93 million in project funds (net of management costs) to some 80 studies that address IOU and Energy Division information needs.[1] The plan often addresses multiple needs in the same study. Information needs are also aggregated into studies that cross programs and sectors in order to maximize resources used for process and impact evaluations that involve the same programs or participants. In this way, the evaluation is more efficient, and eliminates duplication, overlap, and unnecessary disruption of program participants.

This EM&V Plan includes documentation of the planning process itself, descriptions of all EM&V activity areas, an inventory of EM&V information needs, enumeration of all EM&V studies, and a comprehensive and complete EM&V budget. By design, this plan is not a fixed document. Budget allocations and study descriptions will likely shift in coming months in response to observation of actual program accomplishments, as compared to plan, as well as evolving program and regulatory needs. While extensive and comprehensive, this plan is also a starting point. Each of the EM&V studies will be scoped more fully in their initial research planning stage of implementation.

[1] A total of $125 million was allocated for evaluation activities in the CPUC's 2010-2012 energy efficiency portfolio decision; this amount represents four percent of the program portfolio budget.

# 2

# EM&V Goals and Planning Principles

This section summarizes the goals and regulatory requirements for 2010-2012 EM&V, as well as the planning principles used by the EM&V planning team to guide development of the plan.

## 2.1 EM&V Goals and Regulatory Directives

The 2010-2012 evaluation plan builds off the research and findings from the 2006-2008 evaluations, including the impact evaluations overseen by Energy Division and the process evaluations managed by the IOUs. Substantial resources will be allocated to meet other new evaluation objectives. The core objectives of this evaluation were set out in Decision (D.)09-09-047, which approved the 2010-2012 program portfolio. These objectives were slightly modified in D.10-10-033, D. 10-04-092, and in R.09-11-014 and are listed below. Decisions are pending regarding the Risk Reward Incentive Mechanism at the time of this version and will be considered as necessary in updates to this EM&V plan.

1. *Savings Measurement and Verification* – Measurement and verification of savings resulting from energy efficiency measures, programs, and portfolios serve the fundamental purpose of developing estimates of reliable load impacts delivered through ratepayer-funded efficiency efforts. Measurement and verification work should reflect a reasonable balance of accuracy and precision, cost, and certainty, and be designed for incorporation in procurement planning activities.

2. *Program Evaluation* – Evaluation of program-specific qualitative and quantitative measures, such as the program performance metrics and process evaluations, serves a key role in providing feedback for the purposes of improving performance and supporting forward-looking corrections to utility programs and portfolios. In order to maximize return on ratepayer dollars, program evaluations must be completed on a timeline which informs mid-course corrections and/or program planning for the following cycle.

3. *Market Assessment* – In a constantly evolving environment, market assessments are an essential EM&V product needed to set the baseline for strategic design and improvement of programs and portfolios, identify and track appropriate metrics of market change, and measure progress toward achieving the goals of the California Long-Term Energy Efficiency Strategic Plan. Saturation studies, surveys of emerging technologies, market transformation metrics, and

other such analyses which inform estimates of remaining program potential, forward-looking goalsetting, and program planning are key aspects of market assessment.

4. *Policy and Planning Support* - Consistent with prior program cycles, it is essential to reserve funding to support overarching studies and advisory roles which support Commission policy goals. Over the last program cycle this has been inclusive of potential and goals studies, maintenance of the Database for Energy Efficiency Resources, developing databases of best practices for program design and delivery, program design mix, and other means which support the Commission's oversight role, but do not fall under the core EM&V categories described above.

5. *Financial and Management Audit* – Supporting the Commission's oversight function of ensuring the efficient and effective expenditures of ratepayer funds within the utilities' energy efficiency portfolios is another objective of EM&V activities. Rigorous financial and management audits overseen by Commission staff will be critical in ensuring that the utilities' general and administrative costs, and other program expenditures are prudent and reasonable.

## 2.2 EM&V Planning Principles

In developing the 2010-2012 EM&V Plan, the EM&V planning team sought to carry out an evaluation planning process with the following characteristics:

- Focus on a set of high-level, strategic objectives
- Flexibility to anticipate and adjust to changing needs
- Balanced use of qualitative and quantitative prioritization elements
- Balance of proven and innovative studies
- Process that is collaborative and transparent

Each of these principles is discussed below.

### *2.2.1 Focus on High-Level Objectives*

A key objective of the EM&V planning process is to have a clear focus and set of high-level objectives. This focus and associated set of very high-level strategic objectives is needed to effectively and consistently address a very wide range of expressed needs, requirements, and tactical EM&V objectives. Several overarching questions inform the high-level EM&V strategic objectives:

1. What is the effectiveness of the current cycle of portfolio activities?

2. What is the cumulative effectiveness across the last several portfolio cycles?

3. What might be accomplished in future portfolio cycles?

To answer these strategic questions requires extensive and well designed studies that focus tactically on ascertaining:

a) What were the actual portfolio and program activities?

b) Where and how were funds and resources expended?

c) What were the measure, program, and portfolio effects?

d) What was the effectiveness of these activities, on both an absolute and relative basis?

e) How might effectiveness be increased or otherwise improved, both in the current cycle and in future cycles?

To address these questions comprehensively, the evaluation plan takes a strategic perspective that goes beyond typical energy efficiency EM&V is activities. For example, it is common in EM&V to focus on measuring savings associated with adoption of a particular measure or on trying to measure the net effect of the program on the decision to adopt. It is also common in EM&V to carry out process evaluations that focus on the participants' qualitative experience of the program and maps out the various procedures associated with the program. Program theory and logic models are also sometimes used to identify and assess whether the program is having, or likely to have, particular effects (including market effects). However, areas of focus that are less common in typical evaluation portfolios include detailed tracking and analysis of program and portfolio spending and resource deployment; analyses of the effectiveness of marketing and other non-incentive activities; estimation and measurement of incremental, full, lifecycle and present value measure costs; comparative assessment of relative effectiveness across programs, measures or other activities; and fully integrative analyses of all of the above into a comprehensive portfolio management assessment; to name a few.

Thus, the 2010-2012 Energy Efficiency EM&V Plan seeks to include many of the elements above that are often unaddressed in standard evaluations. A related objective is for Energy Division and the IOU EM&V staff to maximize the value, comprehensiveness, and cost effectiveness of EM&V by working collaboratively to design and manage studies and groups of studies rather than have a set of entirely separate process, impact, and market studies.

### *2.2.2 Flexibility to Anticipate and Adjust to Changing Needs*

The planning process will need to be flexible. Though it is obviously important to complete a thorough planning process that provides a comprehensive set of EM&V projects and activities with assigned budgets and timelines, it should also be expected that changes will be needed during the EM&V cycle. Changes in EM&V activities or funding levels may need to occur in response to observation of actual program and portfolio activities that differ markedly from initially planned and forecasted activities, changes in market conditions, changes in regulatory policy or requirements, changes in efficiency measure opportunities, as well as a number of other factors. The EM&V planning process is designed to expect and plan for change.

The planning process itself will be staged and ongoing throughout the 2010-2012 cycle, in order to systematically consider and implement refinements or major changes in activities in response to changing needs, requirements, and research conditions. There are some aspects of the planning process that require detailed analytical processes to carry out as desired. For example, organizing and analyzing the IOUs' forecasted and actual spending and impact claims; inventorying existing EM&V and related market research studies and results; and conducting an EM&V gap analysis. These activities take time to carry out but are important to several major areas of EM&V, especially impact and process evaluation, as well as market studies. Some of these very detailed activities will take place during the research planning stage of EM&V project implementation. At the same time, there are areas of relative urgency that require initiation of some EM&V activities as soon as possible. These include activities needed to meet near-term regulatory deadlines and activities associated with high-priority early EM&V (e.g., that may otherwise result in significant missed opportunities).

### *2.2.3 Balanced Use of Quantitative and Qualitative Information*

The 2010-2012 EM&V Plan includes a balance quantitative and qualitative prioritization processes. Some elements of the planning process lend themselves to more quantitative approaches while others are inherently qualitative. Similarly, some planning is informed by detailed bottom-up analyses of individual research needs, costs, and value; while others required a top-down assessment of relative importance at a high level (e.g., allocating the total budget between program evaluation, portfolio assessment, market assessment, and regulatory oversight, planning, and policy support). Consideration of relative importance also aided comparison and prioritization of specific research needs and projects. Some elements of the planning process, such as impact evaluation, include quantitative data such as the expected share of a particular measure, program, or expenditure activity of the portfolio. Qualitative input was deemed more appropriate for allocating budgets at a high level across major categories of EM&V activities, to align funding with the CPUC's EM&V goals and directives. Qualitative budgeting activities included structured and iterative input from multiple participants in the planning process.

### *2.2.4 Proven and Innovative*

The planning process sought to produce a plan that is proven and innovative without being unduly risky. There are a wide range of EM&V needs that must be addressed, which calls for a very comprehensive plan that uses proven evaluation methods as reflected in the CPUC's 2010-2012 EM&V decision. The plan is also expected to be innovative. The CPUC has the largest EM&V budget associated with voluntary utility or state programs in the country if not the world. It should produce the highest quality EM&V results in the industry and foster advancement of the field. The CPUC identified several areas of interest for the 2010-2012 EM&V cycle to expand into new areas and investigate the feasibility and potential value of new or enhanced methods. A balance was sought between utilization of potentially innovative but possible higher risk methods and studies as compared to those that are already reasonably well understood and proven.

### *2.2.5 Collaborative and Transparent*

The EM&V planning process is intended to be inclusive and transparent. There are a large number of expressed needs for EM&V from a variety of entities including the CPUC, IOUs, their consultants, parties to energy efficiency proceedings, third-party and local government program implementers, as well as other private and public entities. Given the EM&V funding source and associated regulatory responsibilities and requirements for EM&V overseen by the CPUC, the plan focuses on both the Commission's oversight and reporting mandates and the IOUs' portfolio and program improvement needs. Current EM&V decisions direct Energy Division to obtain input from and work collaboratively with IOU evaluation staff, coordinate with other state agencies, and obtain stakeholder input. The Energy Division and IOUs worked collaboratively on this plan, meeting several times and exchanging comments on many documents.

# 3

# Overview of Plan Development Process

This section summarizes the approach utilized to develop the 2010-2012 EM&V plan. The current plan builds on the initial *Joint Energy Division – Investor Owned Utility 2010-2012 EM&V Plan* provided as Attachment 1 of the CPUC's 2010-2012 EM&V Decision 10-04-029, April 8, 2010. The current plan was developed through a comprehensive, collaborative, and iterative research planning process. The following steps formed the basis of this planning process and are discussed in the remainder of this section:

1. Review high-level EM&V goals based on prior decisions and Commission directives
2. Define major EM&V activity categories
3. Prioritize and allocate the available EM&V budget across major activity categories ("top down" budgeting)
4. Conduct a comprehensive inventory of EM&V information needs and combine and prioritize the information needs into EM&V studies and study areas, and estimate EM&V study budgets
5. Develop work authorizations and research plans for ED approved projects

## 3.1 Review High Level EM&V Goals

As discussed in Section 2 above, there are a variety of goals and objectives associated with 2010-2012 energy efficiency EM&V activities. EM&V planning team members used the Commission directed goals and objectives to aid in developing specific EM&V projects and budgets and to help in prioritizing among them.[1] As discussed in Section 3.3 the value and cost of each EM&V activity was assessed in this process in terms of its relative contribution to these EM&V goals.

## 3.2 Define High-Level EM&V Structure and Activity Categories

To prepare the 2010-2012 EM&V plan, the EM&V planning team developed a system to organize the various types of EM&V activities. In this section we present a structure for high-

[1] Several Decisions that have been adopted over the past year were reviewed for requirements and priorities for EM&V activities. These include D.09-05-037; D. 09-09-047; D. 10-04-029; D.10-10-033. Pending decisions or future decisions that affect this program cycle will be considered as they are adopted by the Commission.

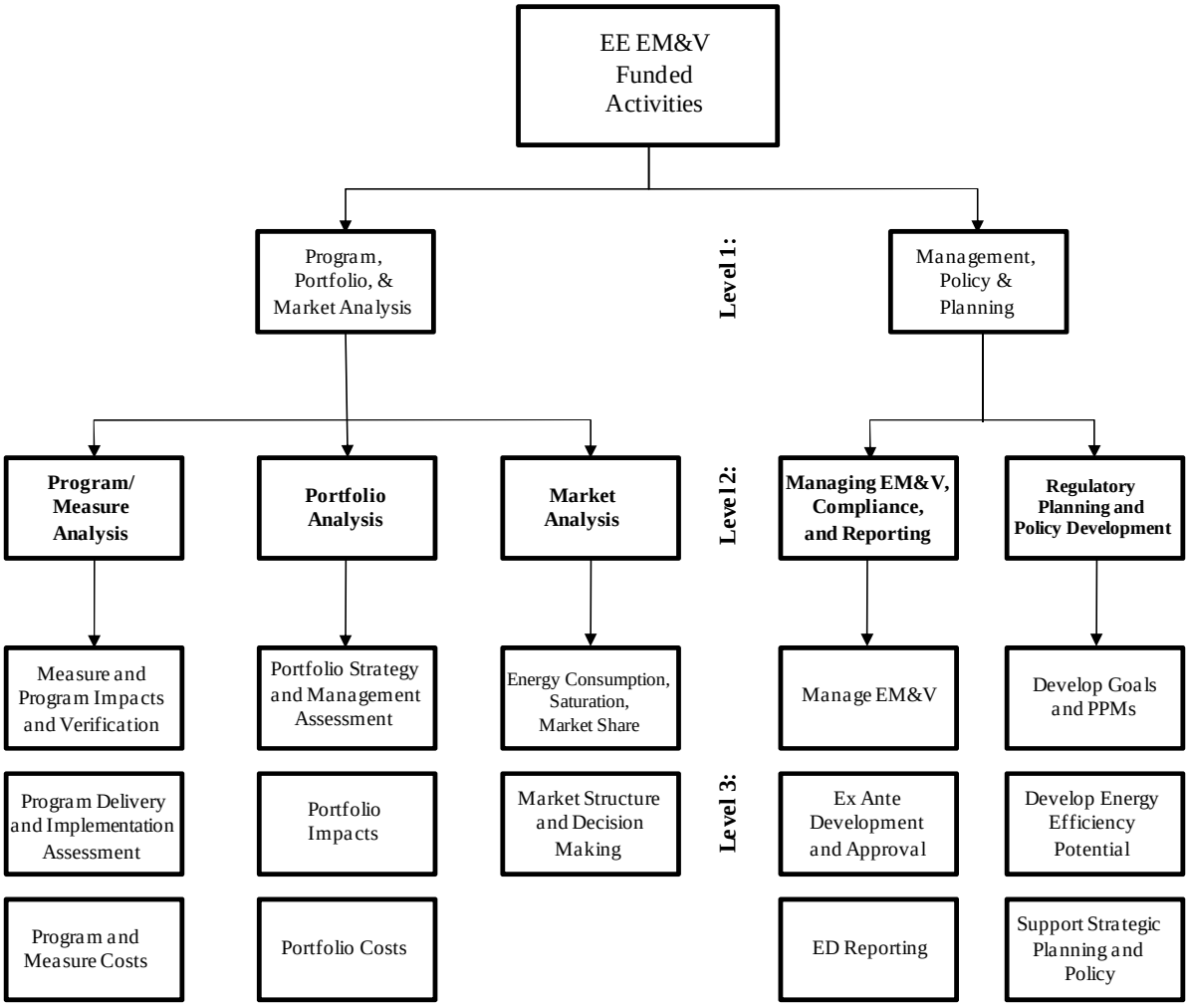
level categorization of EM&V activities. The team used a variety of sources as input in considering different organizational approaches, in particular, the project organization elements of Table C in Attachment 1 of the CPUC's April 8, 2010 EM&V Decision 10-04-029. The resulting categorization is fairly consistent with that in Table C but includes a few structural differences as well. The goal in developing these EM&V activity categories was to provide a planning framework that is useful both for allocating EM&V funding at a high-level, and for organizing EM&V activities in a logical, hierarchal schema to which projects can be assigned and underlying activities mapped with respect to the study objectives and information needs addressed.

The high-level EM&V activity categories are shown in Figure 3-1. Note that specific EM&V projects are assigned a primary activity home in this system, but that many projects address multiple EM&V activity areas. As can be seen from the EM&V activity area and project plans presented in Sections 5 – 9 and the EM&V projects provided in Appendix A, some EM&V projects fit neatly under a particular category while other projects support multiple objectives and draw funding from more than one category area.

The first-level categories we suggest are Program, Portfolio, & Market Analysis and Management, Policy, and Planning. This first level split is very similar to the first level disaggregation in Table C of the Joint ED-IOU initial plan. The primary difference is that we have included the Market Analysis activities in the same branch as program and portfolio analysis. The reason for this is that we wanted to include most of the primary data collection and analysis activities in the same branch, a useful result of which is that the remaining activities are management and policy-driven research and analysis activities that generally would draw on data collected and developed in the program, portfolio, and market analysis projects. This will also enable development of further project synergies that cut across measures, programs, and markets.

In the sub-sections that follow, we discuss the activities associated with the Level 2 and Level 3 EM&V categories.

**Figure 3-1: 2010-2012 EM&V Activity Organizational Structure**




### *3.2.1 Program, Portfolio, & Market Analysis*

These activities collect and analyze primary and secondary data and often feed the management, policy and planning area. Many of these activities are led by ED's EM&V prime and sub-contractors. Some of these activities will be led by IOU EM&V staff and their contractors as authorized by the CPUC EM&V decision and agreed to by ED in the EM&V planning process.

***Program/Measure EM&V***

This area includes all activities related to measurement, verification, analysis, and evaluation of measure- and program-level impacts, costs, and processes. These activities are intended to meet the objectives articulated in D.10-04-029 of assessing progress toward goals and understanding program effectiveness.

*Measure and Program Impacts and Verification*

This area includes all of the traditional program impact evaluation activities as well as related activities that are often missing from typical impact evaluations. This activity area focuses on estimating both gross and net energy impacts. Some baseline activities will be included in this area, in particular, if they address project-specific baselines or can be conducted efficiently as a natural offshoot of the impact work. (More general market baseline work will occur in the Market Analysis area.) Both measure and program impacts are to be considered in this activity area.

Measure impacts will go down to the parameter level as necessary or appropriate to support estimation of impacts, program effectiveness, and overall cost effectiveness. This area will also address impact studies that utilize experimental design to develop energy impact estimates and will support the impact element of energy behavior and pilot program evaluations. It also includes early EM&V activities related to impact evaluations such as those associated with pre-installation analyses for large custom projects.

Program performance metrics (PPMs) related to measure and program impacts will be addressed in this activity area. PPMs related to other areas such as process evaluation and market analysis will be addressed in those activity areas.

The relative effectiveness of program expenditures and design approaches (including both non-incentive and incentive expenditures) on customer adoption of efficiency measures will be addressed through a combination of this area and the Program Delivery and Implementation Assessment area.

This activity area will also include verification of program participation and measure adoption claims. Core activities will include verification of:

- reported program accomplishments (e.g., measure installations) and
- efficiency, size, and other pertinent equipment, system, and measure characteristics of reported program accomplishments.

In addition to developing installation verification rates, a key purpose of this activity is to encourage improved program and portfolio implementation and tracking due to awareness that verification will occur.

Note that funding for verification of measure and program costs is associated with the Program and Measure Costs and Portfolio Costs activity areas but that some of the associated data collection may occur as part of the Measure and Program Impacts and Verification activities to capture data collection efficiencies.

*Program Delivery and Implementation Assessment*

This area includes all of the activities traditionally associated with process evaluation as well as related activities that are sometimes missing from typical evaluations. Program delivery and implementation research is needed to support optimal design and deployment of programs. This research is critical to identify the necessary program improvements to reach program and portfolio goals in a timely and efficient manner. It is critical to the continued improvement and quality control of the portfolio and its component programs.

Program delivery and implementation assessment is concerned with the effectiveness of all facets of program design and implementation. It will examine program structures and processes, techniques and strategies, content and outcomes. Activities will investigate the success of each contributing component, from the processes engaged in program design to the design itself, from the training of staff to the education of participants, from the marketing strategies to the messages themselves. Moreover, it will seek to understand the drivers of success and to identify superior strategies to achieve program goals. It will also serves to clarify and prioritize program objectives.

The activity also will include a number of early EM&V activities to support mid-course corrections. Pilot program evaluations will also be partially supported from this activity area. Program performance metrics (PPMs) related to Program Delivery and Implementation Assessment will be addressed in this activity area. PPMs related to other areas such as impact evaluation and market analysis will be addressed in those activity areas.

The relative effectiveness of program expenditures and design approaches on customer adoption of efficiency measures will be addressed through a combination of this area and the Measure and Program Impacts area.

*Program and Measure Costs*

This activity area will focus on verification and estimation of program and measure costs. Historically, measure costs have not been a significant focus of energy efficiency evaluations. This activity area will utilize both program and market data to verify and estimate full, incremental, and lifecycle measure costs. In addition to estimation of costs associated with common individual measures, technologies, and services, this activity will also consider research on verification and estimation of costs associated with custom and whole-building oriented efficiency projects.

***Portfolio Analysis***

This area includes all activities related to assessment of the overall effectiveness of the portfolios. This includes analysis of costs and impacts not otherwise captured by program- and measure-level EM&V or market analysis.

*Portfolio Strategy and Management Assessment*

This activity area will address the managerial and strategic aspects of portfolio implementation. Research will focus on management structures, implementation systems, work flow management procedures, expenditure and accomplishment tracking, use of information technology and other performance enhancement tools, staffing and incentives, time allocation and tracking, as well as other needs as identified through the EM&V needs assessment process. This activity will be supported by other related EM&V activities, such as those associated with verification and estimation of Portfolio Costs and Program and Measure Costs and evaluation of Program Delivery and Implementation.

*Portfolio Impacts*

This activity area will focus on estimation of portfolio impacts by drawing on the results of the Program and Measure Impact work as well as results from the Market Analysis areas. Most of the intensive data collection and analysis work will be done in the program and market analysis areas with the portfolio impact area focused on integration and meta-analysis. This activity will support the Energy Division's overall evaluation reporting and cost effectiveness analysis (see *ED Reporting*). This activity area may also include comprehensive analyses of program participation and measure adoption that cut across individual programs and program cycles. The intent of this activity area is to assess and compile estimated portfolio impacts, inclusive of direct impacts and any reliable estimates of indirect impacts, market effects, and market transformation. This study area will also provide guidance on impact estimation methods and policies to ensure consistent estimation of impacts across individual studies. All individual measure and program impacts will be compiled to produce estimates of portfolio impacts.

*Portfolio Costs*

This activity area will focus on investigating the expenditures allocated for the management and implementation of programs and costs associated with overall portfolio administration, including general, administrative, and overhead. The portfolio costs study area will conduct a compliance review of the utilities' financial operations, evaluate the overall use of energy efficiency expenditures, and provide recommendations for improving the financial systems and related policies. It will also assess the extent to which the IOUs have made progress with respect to addressing previous recommendations from CPUC financial audits related to energy efficiency

expenditures and associated tracking and reporting requirements and expectations. This area will also coordinate with the Program and Measure Cost area but will focus on areas not directly covered by those activities or costs that are generally fixed and prorated out to programs, i.e., costs associated with overall portfolio management and implementation. This activity area will support the *Portfolio Strategy and Management Assessment* area and ED cost effectiveness analysis.

***Market Analysis***

This area will address all activities related to collection and analysis of data and information from energy efficiency-related markets.

*Energy Consumption, Saturation, Market Share*

This area will cover studies related to quantifying energy consumption and related metrics, equipment and measure saturation, and market share. This area will include significant baseline research activities from updates to studies such as, or similar to, the California Commercial End Use Survey (CEUS), California Lighting and Appliance Saturation Survey (CLASS), and Residential Market Share Tracking (RMST), industrial, agriculture and water use surveys, among others. This area will also address the need to conduct one or more macro consumption evaluation white papers and pilot studies and energy-related program performance metric analyses. Several of these studies are part of the Title 20 requirements from the CEC and their importance for future planning are highlighted in D.09-09-047, D.10-04-029 and D. 0-10-033.

*Market Structure and Decision making*

The study of market structure and decision making is concerned with understanding the mechanisms and processes governing the exchange of energy-related goods and services. This activity will focus on addressing EM&V information needs associated with characterizing and understanding market structures and related customer and supply-side market actor decision making.

Some of the effort in this area will go to the market structure and decision making elements of relevant baseline and program performance metric needs. The need for tracking and understanding market transformation has been consistently cited in Commission directives for this portfolio including both D.09-09-047 and D.10-10-029. Further refinement of market transformation indicators, which would be informed by this research are also a focus of activities described in D.10-10-033.

Activities in this area will provide both measurement and characterization of these mechanisms. Objectives range from documenting the roles of market actors and surveying available products,

services and trade volumes, to the internal decision making processes and drivers of market participants. These activities seek to understand the technical, procedural and psychographic landscape within which energy programs operate. These activities also seek to collect and apply knowledge of this landscape to inform new program design and deployment.

### *3.2.2 Management, Policy & Planning*

Within the Management, Policy, and Planning area, there are two Level 2 sub-groups: *Managing EM&V, Compliance, & Reporting* and *Regulatory Planning and Policy Development*. The organizing concept is that the former focuses primarily on EM&V management and current cycle analysis and reporting, while the latter focuses on forward looking policy and actions to improve portfolio effectiveness.

These activities oversee and draw on data and analysis developed through the program/measure, portfolio, and market analysis area, as well as from data reported directly by the IOUs. Many of these activities will be led by Energy Division with support from ED's contractors and consultants, as well as IOU EM&V staff in areas authorized and agreed to by ED as part of the ongoing EM&V planning process.

***Managing EM&V, Compliance, & Reporting***

This area includes all management and high-level analysis activities related to management of EM&V, EM&V-related regulatory compliance and oversight, and EM&V-related regulatory reporting. These activities are generally focused on the current program cycle.

*Manage EM&V*

This activity area includes core efforts associated with planning and managing EM&V. This activity area will include a portion of Energy Division and IOU EM&V staff time for planning and management of projects, as well as planning, management, quality control, and advising from ED's EM&V consultant team. These activities include but are not limited to the following:

- Development and Implementation of Overall EM&V Management Processes
- Upfront and Continuous EM&V Planning and Communication
- EM&V Project Management and Related Support
- EM&V Data Management
- EM&V Quality Control
- EM&V Methods-Related Studies

*Ex Ante Development and Approval*

This activity area addresses the further development and approval of ex ante impact and cost values along with all relevant underlying and associated parameters. The ex-ante estimates will be developed using the best available data and methodologies. Activities will include updates to the DEER database as well as review and approval of non-DEER work papers and associated impact and cost parameters as per CPUC policy. Activities include (1) ex ante parameter updates, (2) statistical analysis for developing ex ante updates, (3) a portion of deemed measures cost studies, (4) a portion of customized project cost analysis, and (5) useful lives and technical degradation analysis. Note that additional cost research will be conducted in the Program and Measure Cost activity area and that ED's DEER team will lead specification and management of the research conducted in this area. Impact analyses that inform ex-ante assumptions will need to be designed to get results to this team in a timely fashion to allow for timely updates.

*ED Reporting*

This activity area will focus on Energy Division's regulatory-related reporting requirements for energy efficiency. This will include data management activities associated with IOU submittals of program accomplishments and all associated tracking and reporting compliance data. It will also include all Energy Division management, analysis, and reporting activities associated with integrating program, portfolio, and market analysis results into regulatory-required reports of overall IOU energy efficiency impacts, costs, and cost effectiveness. Activities will likely include but are not limited to:

- Development and Oversight of IOU Reporting, Data Requirements, and Procedures
  - Data Tracking and Reporting System Enhancements
- Integration, Analysis, and Reporting of:
  - Portfolio, Program, & Measure Costs
  - Portfolio, Program, & Measure Impacts
  - Cost Effectiveness
  - Goals Attainment
- Updates and Maintenance of Energy Efficiency Websites (DEER, EEGA, CMS, CALMAC, etc.)
- Cost-effectiveness Tool Development
- Avoided costs and GHG Emissions Updates
- Management and Support of Studies and Analyses of Resource Procurement- and Supply-Side Planning-Related Impacts

***Regulatory Planning and Policy Development***

This area includes all activities related to refinement, enhancement, and development of regulatory and strategic planning and policy.

*Develop Goals and PPMs*

This activity area will focus on the development of energy efficiency goals and program performance metrics (PPMs). The latter activity includes only the development of the PPMs and associated EM&V staff oversight of associated data collection and analysis activities. The actual data collection and analysis need to measure and track PPMs will be conducted through the EM&V activity areas associated with primary data collection (i.e., the Program, Portfolio, and Market Analysis areas). Thus, the portion of the PPM-related activity addressed here is relatively small.

With respect to energy efficiency goals, this activity area will focus on the integration and policy-level analysis of supporting data and studies (e.g., energy efficiency potential studies, program and portfolio evaluation, market analysis, etc.). Although this activity is likely to be extensive both with respect to analysis and management of the associated regulatory and stakeholder processes necessary to support development of updated goals, much of the supporting detailed data collection, modeling and analysis will be conducted in other EM&V activity areas. D.08-07-047 mandated that the Energy Division update the goals for 2010-2020 by the fall of 2010, and these activities will address that requirement in addition to providing more information to better align goals with Strategic Plan objectives.

*Develop Energy Efficiency Potential*

This activity area will address projects and studies related to estimation of energy efficiency potential and cost effectiveness on a forward looking basis. Extensive analysis of potential is expected to support next generation programs, development of updated efficiency goals, and refinements to the Strategic Plan and CPUC and State efficiency policies. While D.08-07-047 did not mandate an update to potential and cost-effectiveness, the need for these activities is supported in D.09-09-047 and D.10-04-029 as a means of informing future planning.

*Support Strategic Planning and Policy*

This activity area will provide support to the CPUC's Strategic Planning process, as well as support to the overall energy efficiency policy making process. This category of analysis will inform ongoing strategic planning goals and objectives by providing funding for evaluation

efforts that may not currently or fully anticipated but will be critical to maintaining continuous forward progress toward meeting these stated goals and objectives. It will include development of the next Strategic Plan, related ED consultant support, and targeted studies needed to support the Plan and inform policy making. The latter studies will be those that are not otherwise being conducted in other EM&V activity areas. Areas of direct overlap, particularly those associated with direct evaluation of program impacts and effectiveness, as well as estimation of measure/system impacts and costs, will be conducted in the activity areas responsible for those topics. D. 08-09-010 which adopted the Strategic Plan required that it be updated on a regular basis.

### *3.2.3 Cross-Reference to EM&V Budget Table in Attachment 1 of April 8, 2010 EM&V Decision 10-04-029*

To facilitate comparison of the EM&V organizational system used for the current plan with the projects and project areas suggested in the Joint ED-IOU plan in D.10-04-029, Appendix B, provides a mapping of the EM&V activity areas to those in Table C of the Joint plan.

## 3.3 High-Level Budget Allocation

As noted in Section 2, some elements of the planning and budgeting process lend themselves to more quantitative approaches while others are inherently qualitative. Qualitative input was deemed more appropriate for allocating EM&V funds at a high level across major categories of EM&V activities in order to align funding with the CPUC's EM&V goals and directives. Qualitative budgeting activities included structured and iterative input from multiple participants in the planning process. Quantitative data was used to help allocate EM&V resources within particular activity areas such as impact and process evaluation.

EM&V budgets were developed through two processes: 1) a high-level, top-down process which was conducted at the EM&V activity area level (down to the Level 3 activity presented in the previous section); and 2) a bottom-up, study-level budgeting process. Because of the size and complexity of the EM&V portfolio and the wide variety of EM&V goals and objectives, the top-down and bottom-up budgeting processes were implemented sequentially, beginning with the high-level budget allocation process. This sequence was useful in several respects. The high-level budgeting process focused on engaging senior EM&V and management staff early in the process so that they could provide input and guidance on resource allocation priorities across major activity areas such as impact evaluation, process evaluation, market studies, and regulatory reporting and oversight studies and activities. This high-level budget input was then used to help guide the more complex and detailed bottom-up, study-level budgeting process. The bottom-up, study-level budgeting required a lengthier process, as discussed in the next section, involving a comprehensive inventory of EM&V information needs and process of prioritizing and combining those information needs into EM&V studies and study areas. In general, the bottom up studies

were constrained by the high-level budget guidance and, as a result, had to prioritize study levels and budgets within each major activity area.

Early in the planning, a process was developed to facilitate structured budget input from senior members of the EM&V planning team at the EM&V activity area level. The process included consideration of the value of the EM&V activity relative to EM&V strategic and tactical goals and the relative resource intensity (e.g., cost) of those activities. Allocation of resources across the high level categories was determined qualitatively given the fact that most if not all of the high-level activity areas are required activities under CPUC policy. In this qualitative approach, participants in the high-level funding allocation process allocated the available EM&V budget from down to the Level 3 EM&V activity categories. The budget allocation process began with consideration of the $125 million authorized in Decision 10-04-029 for EM&V associated with the 2010-2012 program cycle. This amount was reduced to the funding that would be available for EM&V projects after funding associated with fixed IOU and ED EM&V staffing costs, as authorized by the Decision, consulting project management and quality control, and funds for contingency were removed.

Several EM&V criteria were developed to help provide guidance and a structured framework to Energy Division and IOU staff and consultants participating in the high-level budget allocation process. These criteria consider the value and contribution (relative importance) of each of the EM&V activity categories with respect to following set of high-level EM&V goals:

- ***Promoting*** **current program and portfolio effectiveness.**
  - This refers to the contribution of the EM&V activity to promoting current program and portfolio effectiveness. This is generally associated with verification types of activities and the associated hypothesis that performance is likely to be improved when one knows that reported accomplishments and costs will be independently checked. EM&V results that are developed and delivered early in the program cycle can also contribute to promoting current effectiveness.
- ***Assessing*** **program and portfolio effectiveness.**
  - Past – This refers to the contribution of the EM&V activity to assessment of the cumulative effects of program and portfolio activities inclusive of past portfolio cycles.
  - Current – This refers to the contribution of the EM&V activity to assessment of the effects and costs of current program and portfolio activities. This importance area generally refers to EM&V results tied to assessment of final (ex post) cycle accomplishments (as opposed to activities that are completed early enough to promote current cycle effectiveness).

  - Future – This refers to the contribution of the EM&V activity to understanding the potential for future program and portfolio impacts and costs (e.g., next cycle ex ante).

- ***Improving* future program, portfolio, planning and policy effectiveness.**

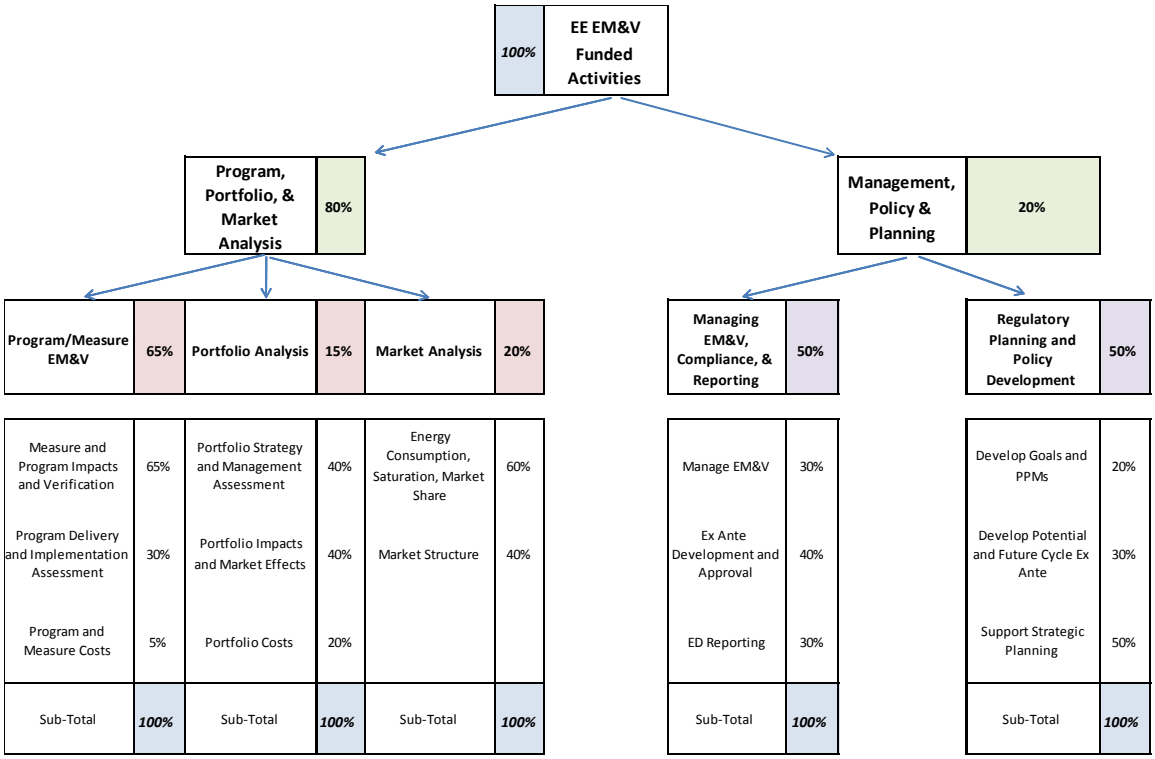
  - This importance area refers to EM&V activities that support development of improved future program designs, portfolio strategies, and energy efficiency policies.

In addition, participants were encouraged and reminded to consider the ***Level of Effort*** the activity is expected to require relative to the other activities. This accounts for the fact that some activity areas are inherently more or less costly regardless of their relative importance.

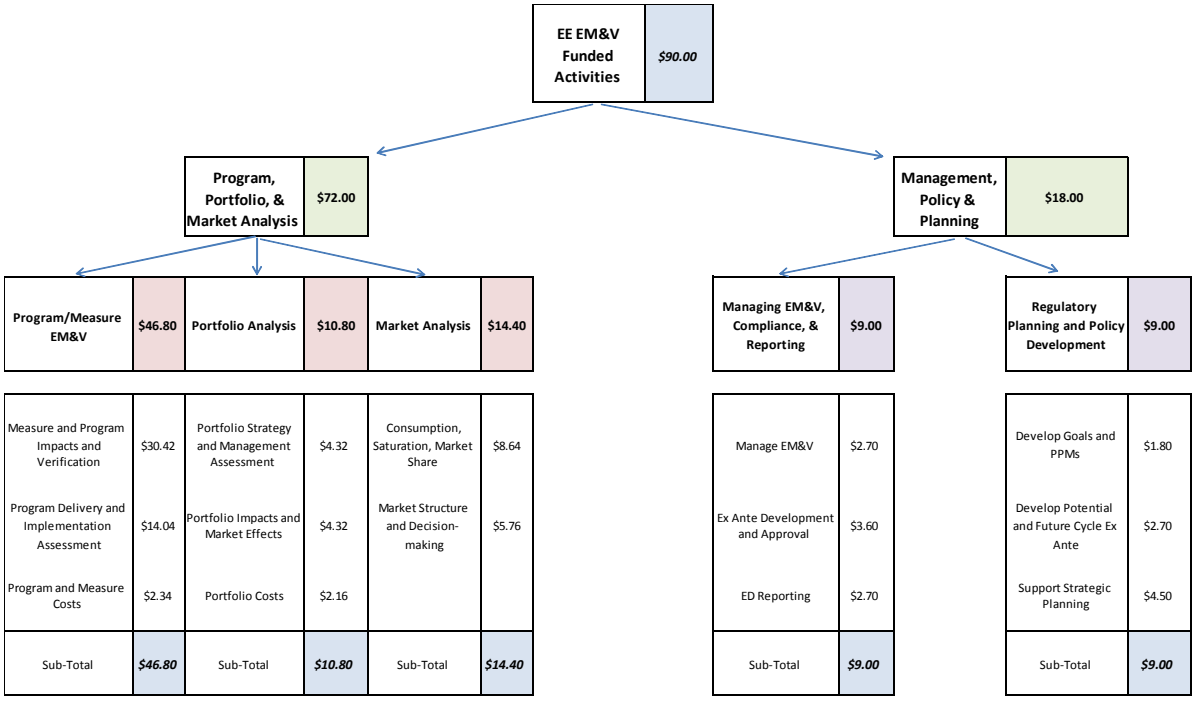
The importance criteria and level of effort guidance was used by participants to present underlying rationales to each other to facilitate working together toward clarification, iteration, and, as much as possible, consensus.

To initiate the high-level budget allocation and prioritization process, a simple spreadsheet was developed for each participant in the high-level budgeting process to fill complete. An example of the spreadsheet is provided in Figure 3-2 and Figure 3-3. The example in these figures is illustrative only, budget results are provided in Section 4. Participants in the high-level budgeting process began by inputting the percentage of the budget they believed was necessary and appropriate for each activity area. Percentages that sum to one hundred percent were entered for each level of the planning structure. The percentages were then converted to dollar amounts using the total dollar amount available for EM&V studies and activities excluding management costs and contingency.

## Figure 3-2: *Example* of High-Level Percentage Allocation Spreadsheet




## Figure 3-3: *Example* of High-Level Dollar Allocation Spreadsheet



The process of completing the high-level budget guidance included the following steps:

- First, Energy Division's EM&V planning and consulting staff individually filled out the budget allocation spreadsheet.
- Second, several meetings were then held with the ED planning group to clarify and discuss each participant's budget recommendations. This discussion focused on clarifying assumptions about which kinds of studies and projects would occur in each of the EM&V activity areas, as well as participants' relative importance rationales (using the criteria discussed above) and underlying estimates of resource requirements. The purpose was to ensure there was adequate consistency in activity area assumptions across each participant and to provide participants with an opportunity to explain their budgeting rationales.
- Third, based on the discussions and resulting clarifications, participants either revised their budget estimates or delegated to a smaller group the task of reconciling their budget estimates with those of the other participants (again, based on the clarifications and priorities expressed by that participant).
- Fourth, a small sub-group summarized the larger ED planning group results and developed an initial (Round 1) budget proposal, which was reviewed and approved by ED management staff.
- Fifth, the Energy Division's Round 1 budget proposal was sent to the IOUs, along with the budget allocation spreadsheet, to obtain the IOUs high-level budget input. The IOUs then reviewed the Energy Division's Round 1 budget and provided comments and recommendations for modifications.
- Sixth, the Energy Division's planning sub-group reviewed the IOU's input and made modifications that produced a revised (Round 2) high-level budget.

This Round 2 budget was then used by the Energy Division team engaged in the more detailed bottom-up EM&V study development and budgeting process as guidance on the likely resources available within each activity area.

## 3.4 Inventory EM&V Information Needs and Combine into Studies/ Project Areas and Budgets

The EM&V planning team began the process of identifying EM&V information needs by assigning staff into teams organized by sector or program area. There were 14 sector/program areas based on the structure of the IOU compliance filings, which include the following.

- Residential
- Lighting Market Transformation

- HVAC
- Commercial
- Industrial
- Agricultural
- New Construction
- Codes and Standards
- Government Partnerships
- Institutional Partnerships
- Emerging Technologies
- Workforce, Education & Training
- Integrated DSM
- Marketing, Education & Outreach

Documents pertaining to each program within these sector/program areas were reviewed to identify EM&V information needs. These documents included:

- Program implementation plans (PIPs)
- A list of IOU-proposed EM&V studies
- Program performance metric (PPM) documents
- 2006-2008 EM&V recommendations
- Materials developed for the ED-IOU Knowledge Transfer meetings

In addition, the planning team reviewed other documents that highlighted EM&V information needs for specific sector/program areas, such as the California Energy Efficiency Strategic Plan, the Joint IOU EM&V Plan (April 8, 2010), and the list of mandated EM&V studies from the 2010-2012 EM&V Decision. Finally, staff reviewed the latest compliance filing information for the 2010-2012 IOU portfolios (e.g., proposed program budgets, energy and demand savings estimates by program and by measure).

EM&V information needs identified through review of these documents were then listed in spreadsheets as follows:

- Sector/Program Area
- Program Name (includes common program name if offered by multiple IOUs, or specific program name if unique to one IOU)
- IOU program ID/number

- EM&V Category (e.g., impact, process, market, PPM)
- Information Need Category (e.g., gross, net, process improvement, penetration, PPM, etc.)
- Information Need (e.g., verification, baseline kWh, purchase rates, supplier participation, etc.)
- Applicable Measures (e.g., "all" or specific measure type/group)
- Applicable Sector/Segment (e.g., residential, multi-family, small retail, etc.)
- Information Need (specify) (e.g., operating hours, average age/efficiency of recycled refrigerators, etc.)
- Source/Document (e.g., PIPs, PPM documentation, IOU list of proposed EM&V studies, etc.)

EM&V information needs were listed program by program within a given sector. In most cases, the EM&V information need was identified in one or more of the documents reviewed by EM&V planning staff. In some cases, staff proposed a set of EM&V information needs based on his/her knowledge of the programs and/or the reliability of the underlying program and/or measure assumptions. The next step in the EM&V information needs identification process was to initiate discussions with ED staff, consultants and IOU staff to clarify/refine this initial set of EM&V information needs.

In addition, a separate but parallel effort was undertaken to identify EM&V information needs for various "overarching EM&V areas," such as portfolio-level analyses, EM&V management activities, IOU and ED reporting systems, supporting strategic planning objectives, etc. These overarching EM&V information needs were identified, clarified and refined by a small group of staff from KEMA, Itron, ED, ED consultants and IOUs and were ultimately combined with the list of sector/program area specific EM&V information needs.

The bottom up list of EM&V information needs were analyzed and organized into a prioritized list of EM&V studies and study areas. In some areas, there was a one-to-one relationship between the top down EM&V activity areas and the type of studies indicated by the bottom up EM&V information needs identification process (e.g., program and measure costs, portfolio strategy and management assessment, etc.). In other areas, studies were identified as mandatory based on Commission decisions or other regulatory or legislative requirements (e.g., support strategic plan).

For the *Program Delivery and Implementation Assessment and Market Structure Decision-making EM&V areas*, studies were developed in coordination with the Energy Division, its consultants and the IOUs. These studies were developed through consideration of IOU EM&V

study proposals, as well as analysis of gaps not addressed through these initial study lists based on the bottom up information needs assessment.

For the *Program and Measure Impacts and Verification EM&V* areas Energy Division, its consultants and the IOUs implemented a prioritization process for determining what types of measures would be evaluated as well as the type of study to implement (e.g., high impact study, custom measure study, etc.) by examining the quantitative data associated with the IOU's 2010-2012 program filings, review of the 2006-2008 impact evaluation results, and consideration of remaining areas of uncertainty associated with priority measures and impact-related parameters.

A total of 82 studies or study areas resulted from this EM&V project planning effort.

See Sections 5 – 9, which discuss the EM&V plans for each activity area, for additional information on development of specific EM&V projects.

As part of the EM&V planning process described above, Energy Division and IOU EM&V staff met several times to collaborate:

1. August of 2010 – IOU and ED staff met in person to review list of 74 projects IOUs had scoped to meet their needs as portfolio administrators. (These were mostly process and market studies, as per Commission direction.)
2. September and October of 2010, ED consultants worked closely with the IOUs to develop an inventory of detailed information needs, and to gather their input on the high-level EM&V budget prioritization.
3. IOU staff me with ED staff and consultants in person in the San Francisco Bay Area for two full days Nov. 8 and 9. This was a mid-point in the evaluation plan process to review fund allocation, research needs and other issues.
4. ED and its consultants continued to hold webinar meetings and otherwise coordinate with IOU staff through November and early December to finish the joint CPUC/IOU evaluation plan.
5. IOU staff met in person with ED and consultants Dec. 14 to discuss IOU comments and input on a draft version of this plan.

## 3.5 Develop Work Authorizations and Research Plans

As discussed above, there are numerous research studies that will be conducted. Once a study has been approved, the next steps are to draft a work authorization and develop a detailed research plan. Although studies may be jointly managed by IOUs and ED staff, studies will be identified as having prime management by either the IOUs or ED. The work authorization process will differ depending on if the study is an IOU or ED "managed" study.

For ED managed studies, the CPUC has contracted with two prime contractors (Itron and KEMA) to provide project management services for the 2010-2012 period. In addition to the core task of preparing this overall EM&V work plan, the prime contractors will be responsible for finalizing work authorizations under the direction of ED staff, and managing the implementation of the work authorizations using in-house staff and/or subcontractors.

The prime contractors and their subcontractors, along with guidance from ED management and their consultants, and IOU staff, will then develop a detailed research plan that specifies the work scope and deliverables and set budgets and schedules for each of the EM&V studies. The research plans will include further prioritization of objectives and activities based on review and analysis of the availability and quality of existing EM&V and related research studies, as well as assessment of current uncertainty levels and the potential for further research to cost effectively reduce key uncertainties. The research plans will also make work expectations transparent and clearly understood for the ED project managers, the project implementation teams, project stakeholders and any interested member of the public.

It is expected that for the IOU managed studies, the IOUs will contract with qualified consultants, and that contract will be similar in content to an ED work authorization. Then, those contractors, along with guidance from IOU management, ED management and their consultants, Itron and KEMA, will develop a detailed research plan in a similar manner, specifying the work scope and deliverables and setting budgets and schedules for each study.

# 4

# EM&V Budget Summary

In this section we present summaries of the EM&V budgets by activity area and project. In Table 4-1we summarize the budget by the EM&V activity categories introduced in Section 3 of this plan. In Table 4-2, we present a summary list of individual EM&V projects and budgets. The EM&V projects are explained in more detail in Sections 5 – 9 and Appendix A.

In Table 4-1, the individual project budgets presented in Table 4-2, Appendix A, and Section 5-9, are aggregated up to the EM&V activity areas. Two columns of budget summary are shown in Table 4-1. The first column, labeled "By Primary Category", sums the entire individual project budgets based on which EM&V Activity Category they were assigned to as their primary area. The second column, labeled "By Functional Allocation", aggregates the portion of the individual project budget that was estimated to be associated with the EM&V Activity Category. As shown in Appendix A, by design, many projects address multiple EM&V activity categories. In particular, a number of Program Delivery and Implementation Assessment projects also include market characterization study elements, which is reflected in the fact that the functional allocation budget for the Market Structure and Decision-making category is higher than the budget associated with projects assigned to MSD as their primary category.

In addition to the high-level summary of EM&V budgets by activity area, Table 4-1 also includes budget line items associated with Energy Division, IOU, and consultant EM&V project management. The table also shows that a portion of the CPUC authorized $125 million for EM&V associated with the 2010-2012 programs is assigned to a reserve fund during this initial stage of EM&V implementation. A reserve fund is important to support the need for flexibility to adapt to changing program, portfolio, and regulatory EM&V needs throughout the program cycle. A reserve fund of $10 million is targeted for this purpose. To achieve the targeted reserve fund, given the total authorized amount and EM&V management allocations, the EM&V project budgets will need to set aside a portion of their funds to the reserve.

## Table 4-1: EM&V Budget – High Level Summary

| EM&V Activity Categories | | | 2010-2012 EM&V Budgets | |
|---|---|---|---|---|
| | | | By Primary Category | By Functional Allocation |
| Program Portfolio & Market Assessment | Program/Measure EM&V | Measure and Program Impacts and Verification | $31,500,000 | $31,918,000 |
| | | Program Delivery and Implementation Assessment | $17,819,000 | $10,977,600 |
| | | Program and Measure Costs | $2,500,000 | $2,805,500 |
| | Portfolio Analysis | Portfolio Strategy and Management Assessment | $3,000,000 | $3,000,000 |
| | | Portfolio Impacts | $4,500,000 | $4,500,000 |
| | | Portfolio Costs | $3,000,000 | $3,000,000 |
| | Market Analysis | Energy Consumption, Saturation, and Market Share | $10,550,000 | $11,692,167 |
| | | Market Structure & Decision-making | $1,375,000 | $5,165,567 |
| Management, Policy & Planning | Managing EM&V, Compliance & Reporting | Manage EM&V | $1,400,000 | $2,000,000 |
| | | Ex Ante Development and Approval | $6,000,000 | $6,138,000 |
| | | ED Reporting | $2,850,000 | $2,850,000 |
| | Regulatory Planning and Policy Development | Develop Goals and PPMs | $1,250,000 | $1,000,000 |
| | | Develop Potential and Future Cycle Ex Ante | $2,600,000 | $3,047,167 |
| | | Support Strategic Planning and Policy | $4,600,000 | $4,850,000 |
| EM&V Project Total | | | $92,944,000 | $92,944,000 |
| EM&V Projects Less Portion for Reserve Funds | | | $86,750,000 | $86,750,000 |
| Reserve Funds (includes project reserves) | | | $10,000,000 | $10,000,000 |
| ED Consultant Project Management & Quality Control | | | $10,000,000 | $10,000,000 |
| IOU EM&V Staff | | | $15,250,000 | $15,250,000 |
| CPUC EM&V Staff | | | $3,000,000 | $3,000,000 |
| Total 2010-2012 EM&V Budget | | | $125,000,000 | $125,000,000 |

Table 4-2 provides a detailed listing of each EM&V study or study group. This table is organized first by the primary EM&V activity category (e.g., Measure and Program Impacts, Program Delivery and Implementation Assessment, etc.) and then by Study Group (e.g., Process Evaluation, Market Share Tracking, Market Assessment, etc.). Each study has been assigned a Study Name that describes the primary research activities to be included in the scope. Each of these studies is described in more detail in the appropriate section (see Sections 5 – 9). For example, studies listed under Program Delivery and Implementation Assessment are discussed in Section 5.2.

Table 4-2 also shows the allocated budget for each EM&V study or study group. In some cases, EM&V projects within a study group were either partially or completely funded using 2009 EM&V funds.

Finally, the Study Manager column refers to ED-managed or IOU-managed studies (or, in some cases, this has yet to be determined). All of the EM&V studies described in this EM&V plan will be managed by either an ED or IOU project manager. For the purpose of this EM&V plan, the distinction between IOU-managed and ED-managed projects has been preliminarily made based on the nature of the underlying EM&V information needs identified within each study area. Studies that have almost an exclusive emphasis on the need for process improvements have been designated as "IOU-Managed" and studies that have a broader set of research needs (policy, process, market and impact) have been designated as "ED-managed." As ED and the IOUs develop and refine the scopes of the specific projects, and as the IOUs seek approval for projects from ED, ED will make a determination regarding management responsibility for all EM&V projects. See more detailed discussion in Section 5.2 and Section 11 related to EM&V study management structure.

## Table 4-2: EM&V Budget – Individual EM&V Project Summary

| Primary EM&V Activity Area (Level 3) | Study Group | Study Name | XRef # | 2010-2012 EM&V Project Budget | Study Manager | Funding Source | Pre 2010-2012 Budget |
|---|---|---|---|---|---|---|---|
| **Measure and Program Impacts and Verification** | Detailed Impact Evaluation of High Impact Measures | Detailed Impact Evaluation of High Impact Measures | 1 | $10,000,000 | ED | 2010-2012 | $0 |
| | Impact Evaluation of Custom Measures | Impact Evaluation of Custom Measures | 2 | $9,000,000 | ED | 2010-2012 | $0 |
| | Impact Evaluation of Strategic Measures | Impact Evaluation of Strategic Measures | 3 | $5,000,000 | ED | 2010-2012 | $0 |
| | Parameter Focused and Cross-Cutting Impact Evaluations | Parameter Focused and Cross-Cutting Impact Evaluations | 4 | $4,500,000 | ED | 2010-2012 | $0 |
| | Verification and Ex Ante Review/Update Study for Moderate Impact Measures | Verification and Ex Ante Review/Update Study for Moderate Impact Measures | 5 | $1,000,000 | ED | 2010-2012 | $0 |
| | Early EM&V for Non-Residential Custom Projects - ED EM&V Funds | Early EM&V for Non-Residential Custom Projects - ED EM&V Funds | 6 | $2,000,000 | ED | 2010-2012 | $0 |
| | Paramater Focused and Cross-Cutting Impact Evaluations | CFL Laboratory Testing | 7 | $0 | ED/SCE | 2009 | $760,000 |
| **Program Delivery and Implementation Assessment** | Process Evaluation | Overarching Process Evaluation of All Residential Programs | 8 | $500,000 | ED | 2010-2012 | $0 |
| | Process Evaluation | Process Evaluation of Sempra's Residential Programs | 9 | $600,000 | IOU | 2010-2012 | $0 |
| | Process Evaluation | ARP Early Feedback Evaluation, Process Evaluation and Market Assessment | 10 | $600,000 | IOU | 2010-2012 | $0 |

| Primary EM&V Activity Area (Level 3) | Study Group | Study Name | XRef # | 2010-2012 EM&V Project Budget | Study Manager | Funding Source | Pre 2010-2012 Budget |
|---|---|---|---|---|---|---|---|
| **Program Delivery and Implementation Assessment** | Process Evaluation | Comprehensive Process Evaluation and Market Assessment of BCE and HEER Program | 11 | $750,000 | IOU | 2009 and 2010-2012 | $150,000 |
| | Process Evaluation | HEES and Related Programs Process Evaluation | 12 | $400,000 | IOU | 2009 and 2010-2012 | $44,000 |
| | Process Evaluation | Process Evaluation of MFEER and CMHP Programs | 13 | $300,000 | IOU | 2010-2012 | $0 |
| | Process Evaluation | Whole House Process Evaluation and Market Assessment | 14 | $500,000 | IOU | 2010-2012 | $0 |
| | Process Evaluation | Moderate Income Direct Install (MIDI) Program Process Evaluation | 15 | $200,000 | IOU | 2010-2012 | $0 |
| | Process Evaluation | Residential New Construction Process Evaluation and Market Characterization | 16 | $350,000 | IOU | 2010-2012 | $0 |
| | Process Evaluation | Overarching Process Evaluation of All Nonresidential Programs | 17 | $1,500,000 | ED | 2010-2012 | $0 |
| | Process Evaluation | Process Evaluation of Sempra's Nonresidential Programs | 18 | $1,000,000 | IOU | 2010-2012 | $0 |
| | Process Evaluation | Process Evaluation of Nonresidential Retrofit Programs | 19 | $1,750,000 | IOU | 2010-2012 | $0 |
| | Process Evaluation | Energy Savings Calculation Tools Development for Existing Building Commissioning (EBCx) Program | 20 | $0 | IOU | 2009 | $112,000 |
| | Process Evaluation | Nonresidential New Construction Process Evaluation and Market Characterization | 21 | $350,000 | IOU | 2010-2012 | $0 |
| | Process Evaluation | Lighting Programs Process Evaluation and Market Characterization | 22 | $1,500,000 | TBD | 2010-2012 | $0 |

| Primary EM&V Activity Area (Level 3) | Study Group | Study Name | XRef # | 2010-2012 EM&V Project Budget | Study Manager | Funding Source | Pre 2010-2012 Budget |
|---|---|---|---|---|---|---|---|
| **Program Delivery and Implementation Assessment** | Process Evaluation | HVAC Programs Process Evaluation and Market Characterization | 23 | $900,000 | TBD | 2009 and 2010-2012 | $155,000 |
| | Process Evaluation | Local Government Partnerships Program Process Evaluations | 24 | $300,000 | ED | 2010-2012 | $0 |
| | Process Evaluation | ME&O Program Process Evaluation | 25 | $400,000 | IOU | 2009 and 2010-2012 | $104,000 |
| | Process Evaluation | WET and Related Educational Program Process Evaluations | 26 | $500,000 | IOU | 2010-2012 | $0 |
| | Process Evaluation | ETP Process Evaluation and Market Assessment | 27 | $900,000 | ED | 2010-2012 | $0 |
| | Process Evaluation | "Omnibus" IDSM Program Process Evaluation | 28 | $250,000 | ED | 2010-2012 | $0 |
| | Process Evaluation | C&S Market Assessment and Process Evaluation | 29 | $500,000 | TBD | 2009 and 2010-2012 | $17,200 |
| | Process Evaluation | Early EM&V Research for All Programs | 30 | $500,000 | IOU | 2010-2012 | $0 |
| | Process Evaluation | ZNE Market and Process Assessment | 31 | $1,400,000 | IOU | 2010-2012 | $0 |
| | Process Evaluation | Evaluation of PG&E's OPOWER Pilot Program | 32 | $350,000 | IOU | 2010-2012 | $0 |
| | Process Evaluation | SCE's Enhanced Inspection Study | 33 | $479,000 | IOU | 2010-2012 | $0 |
| | Process Evaluation | SCE's Catalina Island Program Improvement Assessment | 34 | $0 | IOU | 2009 | $25,000 |
| | Best Practices Assessment | ACEEE "Big Savers" Best Practices Study | 35 | $40,000 | IOU | 2010-2012 | $0 |
| | Best Practices Assessment | Overarching Best Practices Assessment | 36 | $500,000 | ED | 2010-2012 | $0 |
| | Adoption Effectiveness Assessment | Adoption Effectiveness Assessment | 37 | $250,000 | ED | 2010-2012 | $0 |

| Primary EM&V Activity Area (Level 3) | Study Group | Study Name | XRef # | 2010-2012 EM&V Project Budget | Study Manager | Funding Source | Pre 2010-2012 Budget |
|---|---|---|---|---|---|---|---|
| **Program Delivery and Implementation Assessment** | Integration Strategy Assessment | Overarching Study on Integration Effectiveness | 38 | $250,000 | ED | 2010-2012 | $0 |
| **Program and Measure Costs** | Program and Measure Costs | Measure Cost Study | 39 | $2,000,000 | ED | 2010-2012 | $0 |
| | Program and Measure Costs | Measure Cost Study Data Collection Support | 40 | $500,000 | ED | 2010-2012 | $0 |
| **Portfolio Strategy and Management Assessment** | Portfolio Strategy and Management Assessment | Portfolio Strategy and Management Assessment | 41 | $3,000,000 | ED | 2010-2012 | $0 |
| **Portfolio Impacts** | Portfolio Impacts | Portfolio Impacts | 42 | $2,000,000 | ED | 2010-2012 | $0 |
| | Market Effects | Market Effects and Transformation Research | 43 | $2,500,000 | TBD | 2010-2012 | $0 |
| **Portfolio Costs** | Portfolio Costs | Portfolio and Program Financial Audit & Analysis | 44 | $3,000,000 | ED | 2010-2012 | $0 |
| **Energy Consumption, Saturation, and Market Share** | Macro Consumption | Macro Consumption White Papers | 45 | $150,000 | ED | 2010-2012 | $0 |
| | Macro Consumption | Macro Consumption Pilot Studies | 46 | $500,000 | ED | 2010-2012 | $0 |
| | Saturation | Residential On-Site/Metering Survey | 47 | $2,000,000 | ED | 2010-2012 | $0 |
| | Saturation | Residential Appliance Saturation Survey (RASS) | 48 | $200,000 | ED | 2010-2012 | $0 |
| | Saturation | Industrial Customer Surveys | 49 | $450,000 | ED | 2010-2012 | $0 |
| | Saturation | Industrial End Use Saturation Study (IEUS, pre 2010-2012) | 50 | $0 | ED | Pre 2010-2012 | $2,000,000 |
| | Saturation | Commercial Saturation Survey | 51 | $5,000,000 | ED | 2010-2012 | $0 |
| | Market Share Tracking | Residential Market Share Tracking | 52 | $750,000 | ED | 2010-2013 | $0 |
| | Market Share Tracking | Commercial Market Share Tracking | 52 | $1,000,000 | ED | 2010-2014 | $0 |
| | Market Share Tracking | Industrial and Agricultural Market Share Tracking | 54 | $500,000 | ED | 2010-2012 | $0 |

| Primary EM&V Activity Area (Level 3) | Study Group | Study Name | XRef # | 2010-2012 EM&V Project Budget | Study Manager | Funding Source | Pre 2010-2012 Budget |
|---|---|---|---|---|---|---|---|
| **Market Structure & Decision-making** | Market Assessment | Overarching Residential Sector Market Assessment | 55 | $300,000 | ED | 2010-2012 | $0 |
| | Market Assessment | Overarching Nonresidential Sector Market Assessment | 56 | $300,000 | ED | 2010-2012 | $0 |
| | Market Assessment | Industrial Sector Market Characterization Study | 57 | $225,000 | IOU | 2010-2012 | $0 |
| | Market Assessment | Agricultural Sector Market Characterization and Potential Study | 58 | $0 | IOU | 2009 | $400,000 |
| | Market Assessment | Building/Facility Renovation/Remodel Rates Study | 59 | $300,000 | IOU | 2010-2012 | $0 |
| **Market Structure & Decision-making** | Market Assessment | Consumer Preference Research to Support Lighting Programs | 60 | $0 | IOU | 2010-2012 (program $$, not EM&V) | $150,000 |
| | AKA-B Metrics and Measurement | Measurement and Reporting on AKA-B Metrics | 61 | $250,000 | ED | 2010-2012 | $0 |
| | Market Assessment | CEE Energy Star Awareness Survey | 62 | $0 | IOU | 2009 | $30,000 |
| **Manage EM&V** | Manage EM&V | Manage EM&V (Special Studies, Evaluation Guidelines) | 63 | $1,000,000 | ED | 2010-2012 | $0 |
| | Manage EM&V | EM&V Best Practices Study | 64 | $200,000 | ED | 2010-2012 | $0 |
| | Manage EM&V | Evaluation Methods and Procedures Assessment | 65 | $200,000 | ED | 2010-2012 | $0 |
| **Ex Ante Development and Approval** | Ex Ante | Database for Energy Efficiency Resources (DEER) | 66 | $4,000,000 | ED | 2010-2012 | $0 |
| | Ex Ante | Support Ex Ante Development, Review, & Approval (includes non-DEER) | 67 | $2,000,000 | ED | 2010-2012 | $0 |

| Primary EM&V Activity Area (Level 3) | Study Group | Study Name | XRef # | 2010-2012 EM&V Project Budget | Study Manager | Funding Source | Pre 2010-2012 Budget |
|---|---|---|---|---|---|---|---|
| **ED Reporting** | ED Reporting | ED Reporting | 68 | $2,000,000 | ED | 2010-2012 | $0 |
| | ED Reporting | Savings Decay and Cumulative Goals Analysis | 69 | $100,000 | ED | 2010-2012 | $0 |
| | ED Reporting | Energy Efficiency Load Forecasting Integration | 70 | $250,000 | ED | 2010-2012 | $0 |
| | ED Reporting | Update and Refine Cost-Effectiveness Tools | 71 | $500,000 | ED | 2010-2012 | $0 |
| **Develop Goals and PPMs** | Goals | EE Goals Integration Study | 72 | $500,000 | ED | 2010-2012 | $0 |
| | Goals | Zero Net Energy Potential, Costs, and Goals Sub-Study | 73 | $250,000 | ED | 2010-2012 | $0 |
| | Goals | T24/T20 and "Reach Codes" Compliance Study | 74 | $250,000 | ED | 2010-2012 | $0 |
| | Goals | Strategic Plan Feasibility and Cost-Effectiveness Study | 75 | $250,000 | ED | 2010-2012 | $0 |
| **Develop Potential and Future Cycle Ex Ante** | Potential | Plug Loads Potential Study | 76 | $350,000 | ED | 2010-2012 | $0 |
| | Potential | New Construction Energy Efficiency Potential | 77 | $250,000 | ED | 2010-2012 | $0 |
| | Potential | Integrated Energy Efficiency Potential Study | 78 | $1,500,000 | ED | 2010-2012 | $0 |
| | Potential | Customer Adoption Behavior Study | 79 | $500,000 | ED | 2010-2012 | $0 |
| **Support Strategic Planning and Policy** | Strategic Plan | Information and Services to Support Update to CPUC EE Strategic Plan | 80 | $2,000,000 | ED | 2010-2012 | $0 |
| | Policy Support | Review and Refine Cost-Effectiveness Methods and Inputs | 81 | $500,000 | ED | 2010-2012 | $0 |
| | Strategic Plan | Other Strategic Plan Support | 82 | $2,100,000 | ED | 2010-2012 | $0 |

# 5

# Program and Measure EM&V

## 5.1 Measure and Program Impacts and Verification

### *5.1.1 Summary of EM&V Activity/Study Area*

This EM&V activity area will focus on measure verification and estimation of measure and program savings, both gross and net. This area includes all of the traditional program impact evaluation activities as well as other related activities that are often missing from typical impact evaluations. Baseline activities that address project-specific baselines are also included in this area (whereas, more general market baseline work will occur in the Market Analysis area.) Measure impacts may also focus on specific impact parameters (e.g., operating hours) as necessary or appropriate to support estimation of impacts, program effectiveness, and overall cost effectiveness.

For the most part, studies will be focused on verifying and estimating savings for a specific measure, or group of similar measures. For key measures, verification rates and/or net and gross impacts will be evaluated within measure by program, or by groups of similar programs. However, there may be some program-specific evaluation studies, as well as some cross-cutting studies that are relevant to numerous measure groups, such as evaluating HVAC interactive effects.

Impact estimation and verification analysis will rely on a variety of primary and secondary data collection, including program tracking data, customer billing data, phone surveys, on-site surveys, and monitoring and verification (M&V). Similarly, a variety of analysis techniques will be employed to measure gross and net impacts. This area will also address impact studies that utilize experimental design to develop energy impact estimates and will support the impact element of energy behavior and pilot program evaluations. It also includes early EM&V activities related to impact evaluations such as those associated with pre-installation analyses for large custom projects.

This work will be closely coordinated with the Energy Division's DEER team, the Cost Effectiveness team and the Data Management and Quality Control (DMQC)team to maximize the value of evaluations for future planning and analysis. In particular, the DEER team has been kept abreast of this evaluation planning activity and will continue to communicate with key

evaluation management staff so they are aware of all impact evaluation efforts. The management team conducting each impact evaluation study will coordinate with the DEER team to identify any early evaluation results that would be of value, and incorporate the delivery of those results into the evaluation schedule wherever feasible.

### *5.1.2 Need and Application of Results*

This study area provides valuable input into retrospective evaluation, as well as prospective planning and analysis. Retrospectively, this EM&V activity area is required to ensure that the portfolio of IOU energy efficiency activities is evaluated and assessed comprehensively, as required by CPUC policy as well as evaluation best practices. Verification and measure and program impacts are a necessary input into measure, program, and portfolio cost-effectiveness analysis. Utility incentive mechanisms also rely on the results of these activities.

Prospectively, these activities can provide important input into the development of new ex ante estimates and aid with program planning, goals setting, and understanding future potential.

### *5.1.3 General Approach, Issues, and List of Studies and Activities*

As mentioned above, the verification and impact evaluation studies will, for the most part, be focused on a single measure or measure group. For the purposes of program tracking and reporting, measures can be defined at a very fine level of detail. For example, the IOUs report measure level savings goals and accomplishments for thousands of different measures. The measures that were listed as part of the IOU savings goals for 2010-12 were reviewed and aggregated into 173 measure groups, similar to what was done in the 2006-08 evaluations. Although it is expected that this measure classification will be reviewed and refined over time, particularly as actual participation data is reported, this initial classification was used to help identify and prioritize what measure groups should be evaluated in the 2010-12 cycle, and with what level of rigor the evaluations should be conducted.

It is important to note that consideration was given to whether some or all of the evaluations should be conducted at the program level, instead of at the measure level. In general, the measures that comprise the largest share of savings (>1% of the statewide portfolio), are likely to be installed in a number of different programs. For example, nonresidential indoor linear fluorescent lighting is forecasted to contribute to the savings of dozens of different programs. It was felt that one integrated nonresidential indoor linear fluorescent lighting study could be performed more cost-effectively, and produce more valuable and reliable results, than a number of individual program level evaluations that all contain nonresidential indoor linear fluorescent lighting as a primary measure. Although many of these studies will be focused at the measure level, it will be important for program specific (or program groups, e.g., direct install) results to be reported for certain measure groups. Furthermore, there will be some instances where it is recommended that program focused evaluation take place. Program level evaluations (or

providing program-specific results within a measure level evaluation) will be considered when some of the following conditions apply:

- One or two unique measures are offered in a program and the measures contribute to a significant share (more than 1% or so) of the program's portfolio savings.
- The program delivery mechanism has not been recently studied or is new.
- Significant performance issues were seen in the past or are expected with a given delivery mechanism.
- An experimental design would help compare two different delivery mechanisms that offer similar mix of measures to a similar target market.
- A measure level impact approach is unlikely to provide useful feedback and a program level evaluation is feasible.

As discussed above, there are two primary applications for the results of the verification and impact evaluations – retrospective and prospective evaluations. One of the primary objectives for retrospective evaluation is to evaluate the accomplishments of the 2010-12 portfolio of programs with respect to net and gross energy savings. One of the primary objectives for prospective evaluation is to provide robust and reliable estimates of measure-level savings to aid future program planning and analysis.

Clearly, with 173 measure groups, not all measure groups can be evaluated with a high level of rigor. Therefore, to meet the first objective of a retrospective focused evaluation, it is important to evaluate the measures that contribute the most to the 2010-12 portfolio level of savings (e.g., measures that contribute more than 1% to the statewide kW, kWh or therm savings). Furthermore, measures that have greater levels of uncertainty surrounding their savings estimates should also be emphasized over those measures that currently have reliable savings estimates (e.g., a measure may contribute less than 1% to overall savings, but it contributes in excess of 1% to the uncertainty in overall savings).

To meet the second objective of a prospective focused evaluation, measures that have significant future potential, or are instrumental with respect to meeting the strategic planning goals, would be prioritized. Again, measures that have not been studied in the past which have greater uncertainty would be emphasized. The measures that fall under this second objective are likely different than those falling under the first objective, as these measures are likely to be less mature, and thus are likely to contribute less savings during the 2010-12 program cycle.

Five different types of studies were identified that would be conducted at different levels of rigor and would contribute to one or both of the above two evaluation objectives.

1. Detailed High Impact Measure Studies – these would be very detailed, in-depth studies that would focus on a single measure group, but provide reliable results at the program level for key programs or groups of similar programs. Measure groups that contribute a significant amount to all IOU portfolios (i.e., at least 1% or more) would be strong candidates for these studies, particularly those which were not evaluated in great detail as part of the '06-08 evaluations. These studies would be developed to provide both precise (90/10) ex post savings results at the IOU level, but also yield useful information for current and future program planning. Any program-specific results that are developed will be generated at a level of rigor to produce statistically reliable estimates (generally in the range of 80/20-80/40 if not better). Therefore, these studies would meet both the retrospective and prospective objectives. We would expect there to be approximately 6-10 measure groups identified, with a budget in the range of $1 to $2 million each.
2. Custom Measure Studies – There are a number of measure groups that are comprised of custom measures which contribute a significant amount of savings to the overall portfolio (i.e., approximately 1% to 2%, or more). Furthermore, the savings associated with these measures also typically have very high uncertainty because they are custom measures. Therefore, it is very important from a retrospective evaluation perspective to evaluate these measures. However, because of the custom nature of these measures, it is difficult to develop results that can be applied towards future planning efforts (although an objective of these evaluations can be to develop tools, such as calculators, realization rates or gross savings adjustments, for use in future planning and ex ante savings development). These studies can be costly because they require early evaluation efforts to establish baselines, M&V to develop reliable savings estimates, and net-to-gross data collection using professional staff.[1] Please note that we would categorize the non-resource and indirect impact programs, such as ETP, NRA, CEI, IDSM, etc., along with the custom measure studies. Because of the heterogeneous nature of these measures, in some cases it may make more sense to develop program level evaluations. We would expect there to be approximately 10-20 measure groups or programs identified, with a cost in the range of $250k-$1million (possibly more for program focused studies) per study.
3. Strategic Measure Studies – these would be impact evaluations of measure groups that have significant future savings potential and/or are key to strategic planning goals. These may not be measure groups that are currently providing significant levels of savings (likely less than 2%). Also included in these strategic studies could be impact evaluations focused on pilot programs offered by the IOUs, such as PG&E's OPOWER

[1] It is important to note that the CPUC is currently managing an activity that is reviewing all of the non-DEER IOU workpapers. Many of these non-DEER measures will be studied under this Custom Measure Study classification. These studies will coordinate with the work that is being performed on the non-DEER workpaper review.

Pilot Program. In general, these studies would be more limited in scope ($250-750k each), focused on providing results that can be reliably used for future planning. Results are not necessarily meant to be program-specific to 2010-12 programs (other than any pilot programs that are evaluated), but may be specific to program types for future planning (i.e., direct install versus downstream rebates). We would expect there to be approximately 6-10 measure groups identified.

4. Parameter Level Studies – these would be focused evaluations on measure groups that are not listed above, but comprise a significant level of savings (i.e, at least 1%, and likely in excess of 2%). Measure groups in this category are likely to have been studied in the '06-08 cycle and have relatively reliable existing savings values. These studies are likely to focus on parameters (or possibly customer segments) where the greatest uncertainties (both systematic and random errors) lie with the existing results. Results for certain types of parameters that are expected to vary by program delivery mechanism (such as net-to-gross ratios or verification rates) will be developed by at the program level for key programs or groups of similar programs. Many of the indoor lighting measures might fall under this category. These studies may also include cross cutting studies that are focused on a single parameter, such as an HVAC interactive effects, an RUL/EUL study or a net-to-gross study for measures not evaluated. One cross cutting study that is already underway is the CFL Lab Test study, which is a laboratory study to look at CFL lamp life as a function of usage and switching patterns[2]. We would expect these studies to have a wide range of cost depending on how focused the measure/study is, and the measure's contribution to savings (perhaps again in the range of $250-$1m). Although these programs have a strong emphasis on meeting the retrospective objectives, they will also result in proving important input for updating DEER and other deemed savings values. We would expect there to be approximately 6-10 measure groups/cross-cutting studies identified.

The goal for the above set of studies in categories 1-4 would be that the cumulative savings among these measure groups would comprise 60% or more of the overall statewide kW, kWh and therm savings claim by the IOUs.

[2] The CPUC and SCE have co-funded a laboratory study to look at CFL lamp life as a function of usage and switching patterns. It is important to note that this study has a $760,000 budget that is not funded out of the 2010-2012 evaluation budget. A sample of 3,600 CFLs, designed to be representative of mix of CFL products in the California market and promoted through California IOU programs, was acquired from retail outlets across the state. In September 2010, a two-year "cycle test" was initiated where the 3,600 CFLs were placed on 10 different timing cycles (360 identical batches in each of the 10 cycles) to look at life characteristics under the different switching patterns. One project objective is to combine results of the laboratory cycle test with logger data from real world applications to get better estimates of actual expected CFL life (as opposed to rated life, which is based on 3 hr cycles). The laboratory study will also be conducting a number of other measurements including lamp lumen output (which will allow for a comparison of rated lumens vs measured lumens), lumen depreciation, CRI, CCT, PF, and Mercury content.

5. Verification and Review Study - In addition to the above studies, we would also perform a Verification and Review Study, with the objective being to provide an estimate of ex post savings for a group of measures that comprise enough statewide savings such that the cumulative savings among measures in all five categories would comprise at least 80% of the kW, kWh and therm savings claim by the IOUs.[3] At a minimum, this study would provide a combined verification rate and an ex ante review/update for all measures, and likely a net-to-gross analysis. If there are some "special interest" measures or measure segments, some additional resources may be allocated to those measures to oversample them. This study would primarily meet the needs of the retrospective objectives. Depending on the number of measures that would be covered under this study, the budget could be $1 million and as much as $2 million.

In order to determine which measure groups would be evaluated, and what category of study to assign the measure group, the ED, their contractors and consultants, and the IOUs, went through a formal prioritization process rating each of the 173 measure groups as high, medium, low or no priority. The following criteria were considered when prioritizing each measure, and assigning the measure to a study category:

- Projected and actual savings accomplishments
- Expected uncertainty with savings accomplishments
- Importance for strategic planning goals
- Measure's future potential
- Availability, applicability and reliability of previous evaluation results
- Gaps in previous evaluations
- Likelihood that additional EM&V efforts can reduce existing uncertainty in the measure savings

After prioritizing each of the measure groups, the higher priority measure groups were initially assigned to a study category. Below is the preliminary assignment of measure groups to each study category. Within each study category, some measure groups have been combined, as there would be synergies by evaluating those groups of measures together. For example, the residential consumer electronics and plug load measure groups were combined into a single study, as it is expected that the plug load measures can be evaluated at a low incremental cost if studied in coordination with the consumer electronics measures. Because of these sub-

[3] It is important to note that verification analysis will occur as part of all the other studies (detailed high impact, custom measure, strategic measure, and parameter level studies). Therefore, the verification and review study will supplement those analyses for an additional set of measure groups. Furthermore, as mentioned above, this study will also coordinate with the CPUC's non-DEER IOU workpaper review, as it is expected that there may be some measures that are included in both studies.

groupings, some measure groups were assigned to a higher rigor study category than they otherwise would have been. For example, the residential plug load measure group was moved into a higher rigor study category because of the residential consumer electronics measure group. A priority ranking is also provided in the table to identify the measures that are of the highest priority within a given study category. Generally, the measures that were grouped and re-assigned into a higher rigor category will have a lower priority (such as the plug load measures). Also, measures that have relatively lower savings contributions (i.e., less than 1%) will generally have a lower priority. The table also shows the contribution to the statewide portfolio of kW, kWh and therm savings. It is important to note that the therm savings does not include the negative therm penalties associated with HVAC interactive effects.

Below is a preliminary list of the Detailed High Impact Measure Studies. As mentioned above, many of the measure groups listed below were not initially considered high priority measures, but were grouped with one or more high priority measures. There is a possibility that some of these measures may not be evaluated or moved into the Verification and Review Study if there are no cost-effective synergies associated with evaluating these measures.

**Table 5-1: Detailed High Impact Measure Studies**

| Combined Measure Group Study | Measure Group | Priority | Statewide Contribution to Savings | | |
|---|---|---|---|---|---|
| | | | kW | kWh | Therm |
| Codes and Standards | Codes and Standards | H | 14.5% | 11.7% | 0.0% |
| Nonres Retro-commissioning | Nonresidential Retro-commissioning | H | 2.0% | 0.9% | 1.7% |
| Nonres HVAC Rooftop or Split System | Nonresidential HVAC Rooftop or Split System | H | 1.0% | 2.4% | 0.0% |
| Res Consumer Electronics | Residential Consumer Electronics | H | 2.0% | 1.1% | 0.0% |
| | Residential Plug Load Other Office Equipment | L | 0.0% | 0.0% | 0.0% |
| Indoor Advanced Lighting | Residential Lighting Indoor Advanced | H | 2.9% | 2.3% | 0.0% |
| | Nonresidential Lighting Indoor Advanced | M | 0.4% | 0.5% | 0.0% |
| | Residential Lighting Outdoor Advanced | M | 0.8% | 0.0% | 0.0% |
| Whole Building | Residential Whole Building | M | 0.3% | 1.3% | 1.4% |
| | Nonresidential Whole Building | M | 1.2% | 1.6% | 1.3% |
| Nonres Refrigeration Case Replacement | Nonresidential Refrigeration Case Replacement | M | 1.3% | 1.8% | 0.0% |

Below is a preliminary list of the Custom Measure Studies. We expect that a number the measure groups with lower forecasted savings (<1%) may eventually move into the Verification and Review Study or not be evaluated at all, depending on actual levels of participation.

## Table 5-2: Custom Measure Studies

| Combined Measure Group Study | Measure Group | Priority | Statewide Contribution to Savings | | |
|---|---|---|---|---|---|
| | | | kW | kWh | Therm |
| Early EM&V Study | Various | H | | | |
| Nonres HVAC Chiller | Nonresidential HVAC Chiller | H | 1.4% | 2.6% | 0.0% |
| Nonres Boiler Controls/Heat Recovery | Nonresidential HVAC Boiler Controls | M | 0.0% | 0.0% | 2.9% |
| | Nonresidential Process Boiler | H | 0.0% | 0.0% | 15.7% |
| | Nonresidential Process Boiler Controls | H | 0.0% | 0.0% | 5.7% |
| | Nonresidential Process Heat Recovery | H | 0.0% | 0.0% | 11.7% |
| Nonres HVAC Controls/EMS/VFD | Nonresidential HVAC Controls Other | L | 0.6% | 0.5% | 0.3% |
| | Nonresidential HVAC Economizer | L | 0.1% | 0.0% | 0.0% |
| | Nonresidential HVAC Economizer Adjustment | L | 0.1% | 0.0% | 0.0% |
| | Nonresidential HVAC EMS | L | 0.4% | 0.4% | 0.3% |
| | Nonresidential HVAC VFD | L | 0.8% | 0.6% | 0.3% |
| | Nonresidential HVAC VFD Fan | L | 0.3% | 0.2% | 0.0% |
| | Nonresidential HVAC VFD Other | L | 0.1% | 0.1% | 0.0% |
| | Nonresidential HVAC VFD pump | L | 0.0% | 0.0% | 0.0% |
| Nonres Process VFD/Pumping | Nonresidential Process Pump | H | 2.0% | 1.9% | 0.0% |
| | Nonresidential Process VFD Other | L | 0.0% | 0.0% | 0.0% |
| | Nonresidential Process VFD Pumping | L | 0.1% | 0.1% | 0.0% |
| | Nonresidential Process VFD Unknown | M | 1.2% | 0.6% | 0.0% |
| | Nonresidential Process water conservation and treatment | L | 0.2% | 0.1% | 1.1% |
| Nonres Process Compressed Air | Nonresidential Process Compressed Air | M | 1.4% | 0.9% | 0.4% |
| Nonres Process Motor | Nonresidential Process Motor | H | 1.9% | 1.5% | 0.0% |
| Nonres Process Pipe and Tank Insulation | Nonresidential Process Pipe and Tank Insulation | M | 0.1% | 0.1% | 2.6% |
| Nonres Process Other | Nonresidential Process Controls | H | 1.0% | 0.7% | 7.2% |
| | Nonresidential Process Other | H | 0.9% | 0.5% | 8.1% |
| | Nonresidential Process Pump Off Controller | M | 0.8% | 0.5% | 0.0% |
| | Nonresidential Process Unknown | H | 4.8% | 3.2% | 6.2% |
| | Nonresidential Unknown | M | 0.2% | 0.2% | 2.9% |
| Nonres Steam Traps | Nonresidential Steam Trap HP | M | 0.0% | 0.0% | 1.7% |
| | Nonresidential Steam Trap LP | M | 0.0% | 0.0% | 1.6% |
| Nonres HVAC Unknown | Nonresidential HVAC Unknown | H | 2.1% | 2.1% | 5.2% |
| Nonres Lighting Indoor Unknown | Nonresidential Lighting Indoor Unknown | H | 6.7% | 7.7% | 0.0% |
| Non-resource/Audit Programs | Nonresidential Survey Onsite | H | 1.8% | 1.9% | 0.0% |
| | Residential Survey Onsite | M | 0.4% | 1.0% | 0.0% |
| | ETP/IDSM/CEI/Other non-resource programs | H | n/a | n/a | n/a |

Below is a preliminary list of the Strategic Measure Studies. Upon finalization of the these studies, some measures may not be evaluated or moved into the Verification and Review Study if they are not believed to be as important for future planning (e.g., residential water heating or nonresidential food service), or there are not cost-effective synergies associated with evaluating these measures (e.g., some of the nonresidential plug load or lighting control measures)[4].

### Table 5-3: Strategic Measure Studies

| Combined Measure Group Study | Measure Group | Priority | Statewide Contribution to Savings | | |
|---|---|---|---|---|---|
| | | | kW | kWh | Therm |
| Nonres Consumer Electronics and Plug Load | Nonresidential Consumer Electronics | M | 0.1% | 0.1% | 0.0% |
| | Nonresidential Plug Load Other Office Equipment | L | 0.0% | 0.0% | 0.0% |
| | Nonresidential Plug Load Other | L | 0.1% | 0.1% | 0.0% |
| | Nonresidential Plug Load Sensor | L | 0.0% | 0.0% | 0.0% |
| Nonres Lighting Controls | Nonresidential Lighting Indoor Controls Daylighting | L | 0.2% | 0.3% | 0.0% |
| | Nonresidential Lighting Indoor Controls Occupancy Sensor | H | 0.5% | 0.9% | 0.0% |
| | Nonresidential Lighting Indoor Controls Other | L | 0.5% | 0.6% | 0.0% |
| | Nonresidential Lighting Indoor Controls Unknown | L | 0.2% | 0.1% | 0.0% |
| Nonres High Bay/HID Lighting | Nonresidential Lighting Indoor HID | M | 0.1% | 0.1% | 0.0% |
| | Nonresidential Lighting Indoor High Bay Fluorescent | H | 1.2% | 1.3% | 0.0% |
| Res HVAC Rooftop, Split, Mini-Split System | Residential HVAC Rooftop or Split System | M | 0.1% | 0.5% | 0.0% |
| | Residential HVAC Other | L | 0.0% | 0.2% | 0.0% |
| Res HVAC Room AC | Residential HVAC Room AC | M | 0.3% | 1.1% | 0.0% |
| Nonres HVAC Install | Nonresidential HVAC Install | L | 0.2% | 0.4% | 0.0% |
| Res HVAC Install | Residential HVAC Install | L | 0.0% | 0.0% | 0.0% |
| Nonres HVAC Maintenance/Service | Nonresidential HVAC Coil Cleaning | H | 0.3% | 1.3% | 0.0% |
| | Nonresidential HVAC RCA | H | 0.3% | 1.0% | 0.0% |
| Res HVAC Maintenance/Service | Residential HVAC Coil Cleaning | H | 0.1% | 0.4% | 0.0% |
| | Residential HVAC Duct Sealing and Insul | H | 0.1% | 0.3% | 0.5% |
| | Residential HVAC RCA | H | 0.2% | 1.0% | 0.0% |
| Indoor LED Lighting | Residential Lighting Indoor LED | H | 0.2% | 0.1% | 0.0% |
| | Nonresidential Lighting Indoor LED | H | 0.2% | 0.1% | 0.0% |
| Pilot Program Evaluations | Pilot Program Evaluations, such as OPOWER | H | n/a | n/a | n/a |
| Res Water Heating | Residential Water Heating Faucet Aerator | L | 0.0% | 0.0% | 0.2% |
| | Residential Water Heating Other | L | 0.0% | 0.0% | 0.5% |
| | Residential Water Heating Showerhead | L | 0.0% | 0.0% | 0.5% |
| | Residential Water Heating Storage Water heater | L | 0.0% | 0.0% | 0.3% |
| | Residential Water Heating Tankless Water heater | L | 0.0% | 0.0% | 0.3% |
| Nonresidential Food Service | Nonresidential Food Service | L | 0.4% | 0.3% | 1.0% |

[4] For example, if the nonresidential plug load measures cannot be evaluated at a relatively low incremental cost when coordinated with the nonresidential consumer electronics evaluation effort, than those measures may be moved either to the Verification and Review Study, or not evaluated at all.

Below is a preliminary list of the Parameter Level Studies. Some of the measure groups with lower forecasted savings (<1%) may eventually move into the Verification and Review Study or not be evaluated at all, depending on actual levels of participation, or if there are not cost-effective synergies associated with evaluating these measures.

**Table 5-4: Parameter Level Studies**

| Combined Measure Group Study | Measure Group | Priority | Statewide Contribution to Savings | | |
|---|---|---|---|---|---|
| | | | kW | kWh | Therm |
| Nonres HVAC Evap Cooler | Nonresidential HVAC Evap Cooler | M | 1.5% | 1.1% | 0.0% |
| Nonres Lighting | Nonresidential Lighting Indoor CFL | M | 1.2% | 1.1% | 0.0% |
| | Nonresidential Lighting Indoor CFL Upstream | H | 6.6% | 7.0% | 0.0% |
| | Nonresidential Lighting Indoor Linear Fluorescent | H | 4.1% | 4.6% | 0.0% |
| | Nonresidential Lighting Indoor Linear Fluorescent Delamping | L | 0.4% | 0.4% | 0.0% |
| Res Appliance Laundry and Kitchen | Residential Appliance Laundry and Kitchen | H | 1.5% | 4.0% | 7.3% |
| Res Appliance Recycle Refrigerator and Freezer | Residential Appliance Recycle Refrigerator and Freezer | H | 3.6% | 3.9% | 0.0% |
| Res Lighting | Residential Lighting Indoor CFL | M | 0.9% | 1.0% | 0.0% |
| | Residential Lighting Indoor CFL Fixture | M | 1.4% | 0.8% | 0.0% |
| | Residential Lighting Indoor CFL Fixture Upstream | L | 0.1% | 0.1% | 0.0% |
| | Residential Lighting Indoor CFL Upstream | H | 7.8% | 6.5% | 0.0% |
| | Residential Lighting Outdoor CFL | L | 0.1% | 0.0% | 0.0% |
| | Residential Lighting Outdoor CFL Fixture | L | 0.8% | 0.0% | 0.0% |
| | Residential Lighting Outdoor CFL Fixture Upstream | L | 0.4% | 0.0% | 0.0% |
| | Residential Lighting Outdoor CFL Upstream | L | 0.0% | 0.0% | 0.0% |
| | Residential Lighting Outdoor Other | L | 0.1% | 0.0% | 0.0% |
| | Residential Lighting Outdoor Unknown | L | 0.1% | 0.0% | 0.0% |
| Res Pool Pump | Residential Water Heating Pool Pump | L | 0.2% | 0.4% | 0.0% |
| Lighting HVAC Interactive Effects | Lighting HVAC Interactive Effects | H | n/a | n/a | n/a |
| Net-to-Gross Study | Net-to-Gross Study for Non-Evaluated Measures | M | n/a | n/a | n/a |
| CFL Lab Testing Study | CFL Lab Testing Study | H | n/a | n/a | n/a |
| EUL/RUL Study | EUL/RUL Study | H | n/a | n/a | n/a |

The final study is the Verification and Review Study. It is likely that a number of measures from the above set of studies may be reassigned to the Verification and Review study, as discussed above. Other measures will also be considered for this study based on their actual and forecasted levels of participation, and based on how much cumulative statewide portfolio savings is being

captured by the above studies. Approximately 90% of the forecasted savings is represented by the measure groups listed above, whereas the target was set for a minimum of 60%. Because these are forecasted values, and very little actual data has been included in the analysis, the measure group list was purposely listed well above this 60% target. Furthermore, there were a number of lower savings measures (less than 1% of the portfolio) that are believed to have some synergies with the studied measures, such that it was felt that these lower priority measures could be evaluated at a low incremental cost, and are therefore included in the lists above. But the final list of measure groups evaluated is likely to be reduced, so that the budget can be more appropriately allocated to a fewer number of measure groups to obtain more reliable, valuable and useful evaluation results.

### *5.1.4 Research Plan and Work Order Development*

The measure groups listed above are only an initial assignment, in part, based on forecasted IOU accomplishments. Actual accomplishments will be analyzed and this list will be revised accordingly[5]. Further refinement on the measure group naming[6], and classification of measures into a measure group is also ongoing, so this will also affect the final list of measure groups studied. In addition, uncertainty analysis will be performed to help determine the final list of measure groups to be evaluated. Uncertainty in final savings estimates arises from unmeasured parameters in the baseline, unmeasured parameters in the post case and changes in future conditions and operations of the measure. This analysis will identify opportunities where the uncertainty can be reduced through the evaluation efforts. Measures with proportionally more uncertainty relative to their savings are more likely to be studied, as more value can potentially be gained at the portfolio level by reduced that uncertainty.

As discussed, a priority ranking is also provided for each measure group above. It is expected that some of the lower priority measures may get shifted into the Verification and Review Study, or not evaluated at all, particularly if their actual levels of participation fall short of their forecast. The high priority measures are most likely to remain stable in their prioritization, and are also likely to have research plans developed, and work orders issued before others. As mentioned above, the final list of measure groups evaluated is likely to be reduced, allowing for more resources to be allocated to the studied measures to obtain more reliable, valuable and useful evaluation results.

[5] In fact, we expect that analyzing actual accomplishments will be an ongoing activity and be used to update the measure groups being evaluated and the level of rigor associated with the evaluations.

[6] The CPUC is currently developing a Measure Naming Convention for all unique measures. When this work is finalized, the process for aggregating measures into a measure group, as presented here, will be revised to be consistent with the Measure Naming Convention.

Initial budgets have also been roughly assigned to each measure group listed above, but were done so with the objective being to estimate the overall budget for a given study category[7]. Therefore, these measure group level budgets are not provided. However, as part of the next steps, research plans and draft work orders, including more detailed budgets, will be developed for measures that are of the highest priority.

As part of the detailed research planning and work order development process, we will examine the reliability of existing results and identify where the gaps/uncertainties lie at the parameter level. As mentioned above, uncertainty analysis will allow us to target data collection to get the best value for the EM&V dollar looking at both the uncertainty reductions through data collection and the costs to achieve those reductions. Therefore, evaluation resources will be focused on areas (or parameters) where uncertainty can be reduced most effectively. For example, if existing estimates of operating hours for indoor linear fluorescent lighting measures are considered to be highly reliable and accurate, but baseline wattages are not known with a high level of certainty, then the research plan will focus on reducing the uncertainty in those wattage values.

Although many of these studies are focused at the measure level, it will be important for program specific (or groups of programs using similar delivery strategies, i.e., direct install[8]) results to be reported for certain measure groups, particularly those included in the Detailed High Impact Measure Studies. Assessing the relative effectiveness of various intervention strategies is of keen importance to the ED. As part of the research planning process, forecasted and actual participation levels by program will be examined, to help identify at what level program specific results should be developed. Below is an initial categorization of program type, with seven major categories, and various sub-categories of intervention strategies. The research plans will identify where results should be developed at either the major category or sub-category level. Certain parameters, such as net-to-gross ratios and verification rates, are more dependent on the program delivery mechanism, and therefore are more likely to need to be done by program or program sub-category. If there are certain programs that have a strategic need to have certain parameters evaluated because the results are expected to vary significantly from all other programs (such as a net-to-gross ratio for a new and unique program), then those programs may be relatively over-sampled in order to provide a reliable estimate (i.e., in the precision range of 80/20 to 80/40).

[7] Study category refers to the five study types – detailed high impact measure study, custom measure study, strategic measure study, parameter level study, and verification and review study.

[8] Because there are many relatively small programs (with lower levels of participation), it may not be feasible to obtain program-specific results. However, it may be feasible to group together a number of smaller programs with similar delivery strategies.

| **Program Categorization** | |
|---|---|
| **Major** | **Sub** |
| Core | Direct install<br>Downstream rebate<br>Upstream<br>Calculated<br>Midstream<br>Whole building<br>New Program |
| 3rd Party | Direct install<br>Downstream rebate<br>Midstream<br>Calculated<br>New Program |
| LGP | Direct install<br>Downstream rebate<br>Midstream<br>Calculated<br>New Program |
| Codes and Standards | Code Advancement<br>Code Compliance Enhancement<br>Reach Codes<br>Federal Standards Advocacy |
| ETP<br>Other Partnerships<br>Non-resource/Audit | |

The methods and approaches utilized for impact estimation and verification analysis will rely on a variety of primary and secondary data collection, including program tracking data, customer billing data, phone surveys, on-site surveys, and measurement and verification (M&V). A variety of analysis techniques will be considered to measure gross and net impacts during the research planning process. It is expected that the evaluation protocols used for ’06-08 will help guide the identification and selection of impact and verification methods. These methods will also include approaches that utilize experimental design to develop energy impact estimates and will support the impact element of energy behavior and pilot program evaluations.

For custom measure analysis, early EM&V activities will be employed to help establish baselines and collect information for the net-to-gross analysis, among other things[9]. A separate work order has already been fast tracked for conducting early EM&V activities related to impact evaluations such as those associated with pre-installation analyses for custom projects. This study will be considered a component of the Custom Measure Study category discussed above.

It is also important to note once again that these studies will be closely coordinated with the Energy Division's DEER team, the Cost Effectiveness team and the DMQC team to maximize the value of evaluations for future planning and analysis. The DEER team has structured its management team, such that there are both technology leads (e.g., a nonresidential lighting lead) and cross-cutting parameter leads (e.g., an EUL/RUL lead). These technology and cross-cutting leads will be involved with reviewing all of the relevant evaluation study research plans to ensure that these studies will provide the most value to the DEER team for both the current as well as future updates.

Furthermore, to the extent possible, research plans will be developed to provide for interim results that can help inform future ex ante updates. This will be more feasible if the next program cycle is pushed back a year, which is currently under consideration. But in any case, an emphasis will be made on providing interim results whenever feasible to help with the ex ante and other relevant planning processes. The management team conducting each study will also coordinate with the DEER team and the IOUs to identify any early evaluation results that would be of value, and incorporate the delivery of those results into the evaluation schedule wherever feasible.

### *5.1.5 Budget*

As mentioned above, initial budgets have been roughly assigned to each measure group, but were done so with the objective being to estimate the overall budget for a given category of studies. Therefore, these measure group level budgets are not provided. Below are the initial budgets assigned to each of the study categories. It is important to note that the Custom Measure Studies will include early EM&V activities, as discussed above, to help establish baselines and collect information for the net-to-gross analysis, among other things. Because these activities need to be conducted early on, an Early EM&V Study has been fast tracked. This is listed below as a component of the Custom Measures Studies.

1. Detailed High Impact Measure Studies – $10 million.

2. Custom Measure Studies – $11 million

[9] The CPUC's Proposed Decision to Modify Decision 09-09-047 regarding energy efficiency portfolios for 2010-12, adopts the Energy Division process for approval of non-DEER workpapers and customized projects, and also provides a formal process to finalize all non-DEER*ex ante* values.

- Early EM&V - $2 million

- Ex Post Studies - $9 million

3. Strategic Measure Studies – $5 million

4. Parameter Level Studies – $4.5 million[10]

5. Verification and Review Study - $1 million

Total Budget: $31.5 million

### *5.1.6 Schedule and Key Next Steps*

#### *Timeline*

| Activity | 2010 | 2011 | | | | 2012 | | | | 2013 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Q4 | Q 1 | Q 2 | Q 3 | Q 4 | Q 1 | Q 2 | Q 3 | Q 4 | Q 1 | Q2 |
| Early EM&V Study | X | X | X | X | X | X | X | X | X | | |
| Begin Development of Research Plans for Highest Priority Measures/Studies | X | X | | | | | | | | | |
| Work Orders for Highest Priority Measures/Studies | | X | | | | | | | | | |
| Begin Development of Research Plans for Other Measures/Studies | | X | X | | | | | | | | |
| Work Orders for other Measures/Studies | | | X | X | | | | | | | |
| Interim Results - Ongoing, where Feasible | | | X | X | X | X | X | X | X | | |
| Final Reports- Varies by Study | | | | | | | | X | X | X | X |

* Final report date will depend on the option chosen.

[10] As mentioned above, the CFL Lab Test study is included as one of the parameter level studies, but it is not funded out of the 2010-2012 evaluation budget. The CPUC and SCE have co-funded this study with a $760,000 budget.

## 5.2 Program Delivery and Implementation Assessment

### *5.2.1 Summary of EM&V Activity/Study Area*

Program delivery and implementation assessment is concerned with the effectiveness of all facets of program design and implementation. It examines program structures and processes, techniques and strategies, content and outcomes. It investigates the success of each contributing component, from the processes engaged in program design to the design itself, from the training of staff to the education of participants, from the marketing strategies to the messages themselves. Moreover, it seeks to understand the drivers of success and to identify superior strategies to achieve program goals. It also serves to clarify and prioritize program objectives.

### *5.2.2 Need and Application of Results*

Program delivery and implementation research is needed to support optimal design and deployment of programs. This research is critical to identify the necessary program improvements to reach program and portfolio goals in a timely and efficient manner. It promotes agile management structure, and ensures the timely address of design and deployment issues. It is critical to the continued improvement and quality control of the portfolio and its component programs.

### *5.2.3 General Approach, Issues, and List of Studies and Activities*

The research in this area is a focal point for the IOUs, who as program administrators are especially interested in assessing the success of their programs as they are implemented, as well as the efficacy of their programs' design. The IOUs developed nearly 80 sets of information needs, which were one of the bases for the studies listed in this plan. Many of those 80 sets of study needs deal with one of the four aspects of implementation analysis outlined below, while most others looked at some aspect of market assessment. Section 7.2 on Market Structure and Decision Making is closely related to this section. Studies in both sections have common elements and often include other Market Analysis topics, Management, Policy and Planning and even impact evaluation. As stated in Chapter 3, the cross-cutting nature of the study designs is meant to capture synergies and efficiencies.

However, the Energy Division, with the increased oversight role given it in D.09-09-047, has greatly increased its focus on process evaluation relative to the 2006-2008 program cycle. A number of the studies included here will either be managed by the Energy Division, or by the IOUs in coordination with Energy Division. The management structure of each study is presented in Table 5-5, and explained in detail within the *Study Scope and Management* section below.

Primary objectives of the Energy Division for the studies presented here include assessing how well programs are supporting the goals of the *California Energy Efficiency Strategic Plan*, as

well as ensuring the ratepayer funded programs are implemented effectively and efficiently. Per Decision 09-09-047 in September of 2008, the IOUs and Energy Division developed program performance metrics (PPMs) and market transformation indicators (MTIs). These new metrics are objective, quantitative indicators of the progress of a program toward the short and long-term market transformation goals and objectives in the *Strategic Plan* to track key indicators on both these fronts.

The CPUC's objective in introducing performance metrics is three-fold:

- To track California's progress towards achievement of the *Strategic Plan* objectives, specifically the Big Bold Programmatic Initiatives and other key Plan goals and objectives;
- To inform portfolio development and necessary modifications in future portfolio decisions, including improving program design or eliminating non-performing programs; and
- To target the next generation of improvements and thus continue the cycle of market transformation.

Furthermore, based on Decision 09-09-047, PPMs are also to be used for the following purposes:

1. To Track program effectiveness:

   "We have observed in utility applications, and approved for new utility programs, management structures to track and modify programs to improve their effectiveness, such as the continuous improvement/feedback structures in the commercial sector, the increased attention to process evaluations that we foresee by both utilities and Energy Division, and tracking of program effectiveness via performance metrics. Building benchmarking requirements should also assist utilities in more effectively targeting high energy using buildings and deploying program incentives strategically." (Page 42)

2. To evaluate program-specific quantitative measures:

   "Program Evaluation - Evaluation of program-specific qualitative and quantitative measures, such as the program performance metrics discussed earlier in this decision and process evaluations, serves a key role in providing feedback for the purposes of improving performance and supporting forward-looking corrections to utility programs and portfolios. In order to maximize return on ratepayer dollars, program evaluations must be completed on a timeline which informs mid-course corrections and/or program planning for the following cycle." (Page 300)

Many of the studies presented here include the measurement and reporting of PPMs and MTIs.

Additional areas of strategic importance to the CPUC that will be addressed by these studies include:

- Integration of program offerings involving Demand Response, Distributed Generation and Energy Efficiency across major programs. The CPUC believes offering these elements seamlessly to program participants will promote the Strategic Plan's zero net energy goals, while lowering administrative costs to provide these services.
- Fostering of whole building approaches to energy savings, as a means to reach more comprehensive, deeper savings than are sometimes captured through more standardized measure-based programs, which leave behind savings opportunities that are deemed to costly or difficult to address.
- Insuring the successful implementation of on bill financing. The CPUC see these zero-interest loans as a means to reduce the first-cost barrier to building retrofits in the commercial building and government building sectors. In most of the state, this is a new program.
- Assessing the IOUs success at accomplishing workforce education and training needs identified in a needs assessment through implementation of major programs.
- Tracking performance of programs on key Strategic Plan goals, such as implementation of emerging technologies, implementing more complex mixes of measures in building retrofits, etc., using program performance metrics (PPMs) which are new this cycle.
- Monitoring pilot projects that are of strategic interest to the CPUC.

The array of issues housed within Program Delivery and Implementation Assessment were divided into four major activity areas. This was done in order to better support the budgeting and scoping process. These four activity areas include adoption effectiveness, process evaluation, best practices assessment and integration strategy assessment. To assist the reader in interpreting study scope, the four major component areas of Program Delivery and Implementation Assessment are described below. Again, most studies have elements drawing from research areas extending well beyond those described within Program Delivery and Implementation Assessment.

***Adoption Effectiveness Assessment***

Adoption effectiveness focuses on how program participants respond to program actions such as marketing, referrals, and measure offerings, and will measure and compare the cost-effectiveness of these actions. The study of adoption effectiveness will measure and compare cost-adjusted accomplishments of program activities in leading to measure and practice adoptions.

Adoption effectiveness analysis will yield cost-adjusted metrics of the efficacy of specific program techniques and strategies in achieving energy reduction objectives. Adoption effectiveness will be studied at the program design level, as well as at finer levels of detail such

as by marketing campaigns and informational strategies. Efforts and outcomes will be examined within the context of the targeted customer class and market segment. Analyses will integrate information regarding the resources devoted to a variety of efforts with the outcomes they produce. The results will provide guidance for refined selection of program techniques and strategies going forward.

Adoption effectiveness will assess patterns of participation and patterns of adoption within the context of the associated program strategies and their related costs. The analysis will provide feedback on the effectiveness of specific marketing efforts, customer support services, referrals, and the recommendations offered by the program. Effectiveness will encompass a broad range of objective outcomes, including measure uptake through other programs, the achievement of PPMs, and adoption of non-incented measures and practices. However, it must also perform attribution analysis that builds a causal relationship between program efforts and measureable immediate, intermediate and long-term outcomes. This research activity must examine and seek to understand the differences in the effectiveness of program strategies by customer class and market segment. Moreover, it will seek to understand the reasons behind the success of various strategies as well as the role of non-program factors.

Net-to-gross and cost effectiveness methodologies also speak to adoption effectiveness, but they are not sufficient to address the strategic elements of program design, and to map the causal links between the various program elements and the measured outcomes. Providing a causal connection between the allocation of resources and the selected strategies to the full range of program outcomes is critical feedback for the refinement of future strategies.

***Process Evaluation***

Process evaluation is the study of mechanisms at work in the design, implementation, tracking and participation in a given program. Process evaluation is a systematic analysis designed to yield actionable recommendations to improve the program's design, management, delivery, operations, and objectives, consistent with program and portfolio goals.

Process evaluation includes the creation and on-going refinement of the logic model and theory(ies) that underlie the program design. It will collect evidence to assess whether the program is being implemented in a manner consistent with the original program design, as well as the effectiveness of various program components (e.g., techniques employed in program design and implementation, as well as any training, education and outreach) in achieving the expected outcomes. More generally, it will assess program implementation and delivery effectiveness in the accomplishment of targeted and committed outcomes.

Process evaluation will review application, paperwork and tracking procedures. It will consider evaluation data requirements (both process and impact), and assess the procedures and content of

tracking systems. As appropriate, evaluations will support the *Energy Division Reporting* and *Measure and Program Impact and Verification* activity areas in determining naming conventions and setting appropriate levels for reporting measure accomplishments. The purpose of this element is to ensure comprehensive, accurate and useful tracking at the lowest cost.

Process evaluation will consider quality control procedures for measures, program services, application and paperwork processes, and tracking. It will examine these procedures for efficacy and consistency in deployment.

Process evaluation will examine program marketing strategies, messaging and channel selection in light of the target market characteristics and program objectives. It will assess effectiveness of program marketing and outreach strategies and materials, both overall and for targeted segments and activities. It will seek to understand the outcomes of marketing and messaging efforts and to use that information to provide recommendations for program improvement.

***Best Practices***

Best practices assessment seeks to identify superior program design and implementation strategies, and also to understand the reasons behind the superior performance. Such information ensures full leveraging of collective experience in program implementation, and is intended to be used with prudence and discretion to guide program refinement going forward. These studies will build on the lessons learned from the previous CPUC-IOU funded *National Energy Efficiency Program Best Practices Study* (www.eebestpractices.com).

Best practices assessment will analyze information on the range of designs and techniques, as well as the associated outcomes. The assessment will examine program-specific intervention strategies, as well as the range of programs targeting similar markets and/or technologies. In some cases it may be best to limit the scope to programs operating in the same or similar target markets. In other cases, the assessment may examine all programs with a similar construct/approach operating in a range of markets. Best practices may also glean information from experiences in non-energy programs, where the program mechanism or objectives are similar enough in character to warrant the comparison.

***Integration Strategy Assessment***

Integration strategy assessment will examine program design elements that provide value and energy savings by drawing on goods and services provided by other energy programs, or through other public agencies or the private sector. Integration strategies focus on offering of other energy efficiency programs, distributed generation programs and demand response programs, but may also draw from water savings programs, waste reduction programs, or even job development or educational programs. Integration strategies are in place to support the ability of each program to provide the full value of relevant portfolio offerings to each participant. From

the participant perspective, effective integration provides a greater range of opportunities and solutions. This in turn increases the probability of an optimal match between the host of programs and participants, and supports deeper energy savings.

The assessment of integration strategies will be based on customer satisfaction with their selected programs, customer knowledge of available programs, whether the programs and measures selected by customers were optimal, and the energy saving activities resulting from various integration strategies.

***Overview of Studies and Research Activities***

As discussed in Section 3, specific EM&V studies and research activities have been assigned a primary activity area or "home" in this EM&V plan, but in reality many studies will be designed to address multiple EM&V topics and research activities. Within the category of Program Delivery and Implementation Assessment, some studies fit neatly under a particular category (e.g., process evaluation, best practices, etc.) while other projects support multiple objectives and provide funding to study EM&V topics from more than one category. In particular, most of the studies that have been assigned to Program Delivery and Implementation Assessment as their primary home, will also provide funding to study EM&V topics within the Market Structure and Decision-making category.

With this context, Table 5-5 presents a complete list of EM&V studies that will address research topics within the Program Design and Implementation Assessment. These studies will also address research topics in other categories as shown.

Table 5-5 also shows the difference between ED-managed and IOU-managed studies. ED-managed studies are studies that will be managed by an ED staff project manager and implemented by ED with their contractor teams. As part of the effort to realize the Commission's desire for better collaboration between ED and the IOUs, the IOUs will have the opportunity to provide input into the design and implementation of the ED-managed studies that are not considered part of a CPUC deliberative process, as described in Section 11. However, all project management decisions will be entirely at ED's discretion, unless directed to do otherwise by the ALJ responsible for hearing a Motion for EM&V Dispute Resolution as provided for by Decision 10-04-029.

IOU-managed studies are studies that will be managed by an IOU staff project manager and implemented by IOU staff with consultants contracted directly with the IOUs. ED will be involved in the design, implementation, and oversight of the IOU-managed studies, as described in Ordering Paragraph 4 and Attachment 2 of Decision 10-04-029.

All of the EM&V studies described in this EM&V plan will be managed by either an ED or IOU project manager. The studies may be broken down into more than one study as the scope is further refined during the next phase of project specific planning and work order development. If efficient to do so, ED may choose to break up the scope of a specific EM&V project, as defined in this plan, into two or more separate projects to be assigned to ED and IOU project managers.

For the purpose of this EM&V plan, the distinction between IOU-managed and ED-managed projects has been preliminarily made based on the nature of the underlying EM&V information needs identified within each study area. Studies that have almost an exclusive emphasis on the need for process improvements have been designated as "IOU-Managed" and studies that have a broader set of research needs (policy, process, market and impact) have been designated as "ED-managed." As ED and the IOUs develop and refine the scopes of the specific projects, and as the IOUs seek approval for projects from ED, ED will make a determination regarding management responsibility for all EM&V projects.

## Table 5-5: Summary of EM&V Studies within Primary Home of Program Delivery and Implementation Assessment

| Sector | Program Focus | Study Name | 2010-2012 EM&V Project Budget | Study Manager | Level of Effort by EM&V Research Activity Area: | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | PDIA | MSD | Other | Other Specify: |
| **ED-Managed Overarching Studies** | | | | | | | | |
| Res | All | Overarching Process Evaluation of All Residential Programs | $500,000 | ED | 100% | 0% | 0% | |
| Nonres | All | Overarching Process Evaluation of All Nonresidential Programs | $1,500,000 | ED | 100% | 0% | 0% | |
| Cross-cutting | All | Adoption Effectiveness Assessment | $250,000 | ED | 100% | 0% | 0% | |
| Cross-cutting | All | Overarching Best Practices Assessment | $500,000 | ED | 100% | 0% | 0% | |
| Cross-cutting | All | Overarching Study on Integration Effectiveness | $250,000 | ED | 100% | 0% | 0% | |
| **IOU-Managed Residential Studies** | | | | | | | | |
| Res | All | Process Evaluation of Sempra's Residential Programs | $600,000 | IOU | 100% | 0% | 0% | |
| Res | ARP | ARP Early Feedback Evaluation, Process Evaluation and Market Assessment | $600,000 | IOU | 45% | 30% | 25% | I,C, S, MS, M, P |
| Res | BCE, HEER | Comprehensive Process Evaluation and Market Assessment of BCE and HEER Program | $750,000 | IOU | 60% | 20% | 20% | C, S, MS |
| Res | HEES+ | HEES and Related Programs Process Evaluation | $400,000 | IOU | 70% | 20% | 10% | S, MS |
| Res | MFEER, CMHP | Process Evaluation of MFEER and CMHP Programs | $300,000 | IOU | 80% | 20% | 0% | |
| Res | Whole House | Whole House Process Evaluation and Market Assessment | $500,000 | IOU | 40% | 25% | 35% | I, C, S, MS, P |
| Res | MIDI | Moderate Income Direct Install (MIDI) Program Process Evaluation | $200,000 | IOU | 40% | 25% | 35% | I, C, S, MS, P |
| Res | NC | Residential New Construction Process Evaluation and Market Characterization | $350,000 | IOU | 40% | 40% | 20% | S, MS, P |
| Res | OPOWER | Evaluation of PG&E's OPOWER Pilot Program | $350,000 | IOU | 30% | 0% | 70% | I, M, P |
| **IOU-Managed Nonresidential Studies** | | | | | | | | |
| Nonres | All | Process Evaluation of Sempra's Nonresidential Programs | $1,000,000 | IOU | 100% | 0% | 0% | |

| Sector | Program Focus | Study Name | 2010-2012 EM&V Project Budget | Study Manager | Level of Effort by EM&V Research Activity Area: | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | PDIA | MSD | Other | Other Specify: |
| Nonres | All | Process Evaluation of Nonresidential Retrofit Programs | $1,750,000 | IOU | 60% | 40% | 0% | |
| Nonres | EBCx | Energy Savings Calculation Tools Development for Existing Building Commissioning (EBCx) Program[1] | $112,000 | IOU | 80% | 5% | 15% | I, M |
| Nonres | NC | Nonresidential New Construction Process Evaluation and Market Characterization | $350,000 | IOU | 40% | 40% | 20% | S, MS, P |
| Nonres | All | ACEEE "Big Savers" Best Practices Study | $40,000 | IOU | 34% | 66% | 0% | |
| **Cross-Cutting Studies** | | | | | | | | |
| Cross-cutting | Lighting | Lighting Programs Process Evaluation and Market Characterization | $1,500,000 | TBD | 25% | 35% | 40% | I, C, S, MS, M, P |
| Cross-cutting | HVAC | HVAC Programs Process Evaluation and Market Characterization | $900,000 | TBD | 30% | 35% | 35% | I, C, M, P |
| Cross-cutting | LGP | Local Government Partnerhips Program Process Evaluations | $300,000 | ED | 100% | 0% | 0% | |
| Cross-cutting | ME&O | ME&O Program Process Evaluation | $400,000 | IOU | 80% | 20% | 0% | |
| Cross-cutting | WET | WET and Related Educational Program Process Evaluations | $500,000 | IOU | 90% | 10% | 0% | |
| Cross-cutting | ETP | ETP Process Evaluation and Market Assessment | $900,000 | ED | 55% | 20% | 25% | I, M, P |
| Cross-cutting | IDSM | "Omnibus" IDSM Program Process Evaluation | $250,000 | ED | 90% | 10% | 0% | |
| Cross-cutting | C&S | C&S Market Assessment and Process Evaluation | $500,000 | TBD | 15% | 30% | 55% | I, C, S, MS, M, P |
| Cross-cutting | ZNE | ZNE Market Assessment and Process Evaluation | $1,400,000 | IOU | 30% | 35% | 35% | C, M, P |
| Cross-cutting | All | Early EM&V Research for All Programs | $500,000 | IOU | 0% | 0% | 100% | I, M |
| Cross-cutting | All | SCE's Enhanced Inspection Study | $479,000 | IOU | 100% | 0% | 0% | |
| Cross-cutting | All | SCE's Catalina Island Program Improvement Assessment[1] | $25,000 | IOU | 100% | 0% | 0% | |

[1] Studies are nearly complete and utilized 2009 EM&V funding.
*Key:*
*Program Delivery and Implementation Assessment (PDIA, Market Structure and Decision-making (MSD), Measure and Program Impacts (I), Program and Measure Costs (C), Energy Consumption (EC), Saturation (S), Market Share (MS), Manage EM&V (M), and Planning and Policy (P)*

***Study Scope and Management***

The following briefly describes key components of each of the EM&V studies included in Table 5-5.

*Overarching ED-Managed Studies*

**Overarching Process Evaluation of All Residential Programs, and Overarching Process Evaluation of All Nonresidential Programs**

There are two ED-managed overarching process evaluations: one focused on the residential sector programs and one focused on the nonresidential sector programs. The nonresidential sector study will cover all programs, including statewide, local, government and institutional partnerships, and third party programs. Both the residential and nonresidential studies will address overarching program delivery and implementation issues, including adoption effectiveness, best practices and integration effectiveness. For the most part, these studies will draw on primary research conducted as part of IOU-led process evaluations, as well as other sources (e.g., market studies, impact studies, etc.). In addition, the scope of this study could include stand-alone research that ED conducts to fill gaps not covered by the IOU-led process evaluations.

For example, particular emphasis may be given to areas of strategic interest to the CPUC, including a study of the On-bill Financing Program, the integration of emerging technologies into core nonresidential programs, assessment of comparative use or other types of behavioral change programs, and cost-effectiveness assessments for different marketing and outreach strategies. These studies will produce quarterly reports in an effort to provide more timely feedback to program planners and portfolio managers. Annual reports and a final report will also be generated, documenting interim findings and actions taken by IOUs to improve programs during this cycle. The annual reports will present results related to PPMs, MTIs and other strategic planning goals and objectives.

**Overarching Adoption Effectiveness Assessment, Overarching Best Practices Assessment, and Overarching Study on Integration Effectiveness**

Three ED-managed studies are overarching studies focused on key program delivery and implementation components. There is one overarching study focused on adoption effectiveness, which will assess participation and measure adoption levels by customer class, market sector, and other key segmentation factors. This study will also analyze the key factors driving participation and measure adoption rates. The second study is an overarching best practices assessment. The study will focus on program-specific intervention strategies, as well as perform a comparative assessment of programs targeting similar markets and/or technologies. Best practices research may extend to programs and areas outside of CA, and will include the

development of best practices in benchmarking. The third and final overarching study focused on a program delivery and implementation is the study of integration effectiveness. This study will evaluate the effectiveness of integration strategies, including the integration of various EE programs (e.g., ETP, ME&O, WE&T, C&S), as well as low income, DG and DR.

Similar to the ED-managed, overarching process evaluations described above, all of these studies will draw on primary research conducted as part of other studies but may also include stand-alone research to fill gaps. These studies will also provide interim reports as well as more annual and final reports documenting the full effort. As appropriate, these studies will report on results related to PPMs, MTIs and other strategic planning goals and objectives.

*IOU-Managed Residential Studies*

There are nine studies focused on residential programs that will be managed by the IOUs. These studies are described below:

**Overarching Process Evaluation of All SDG&E and SoCalGas' Residential programs.** Sempra has proposed to conduct independent process evaluations of the residential retrofit programs included within the SDG&E and SCG portfolios. The primary goal of these studies is to assess the effectiveness of program design, program implementation and marketing activities. The studies will be designed to address process evaluation issues for all residential retrofit programs, including statewide, local and third party. In addition to funding its own independent process evaluations, Sempra plans to provide a limited amount of EM&V funding for process/market studies being managed by PG&E and SCE to the extent that those studies will be collecting data/reporting on statewide baseline metrics, PPMs, MTIs, etc.

**Appliance Recycling Program (ARP) Early Feedback Evaluation, Process Evaluation and Market Assessment**. There are three components of this study: (1) an early feedback evaluation of the ARP retailer trail component, (2) an IOU-led process evaluation of the ARP, and (3) a coordinated market assessment of the ARP and retailer trail components. ED will work closely with the IOUs in the management of each of these studies, and will ensure coordination with related studies being managed by ED and/or the IOUs.

Specific goals of the early feedback evaluation include assessing whether or not the retailer trials had the desired outcomes using treatment v. control group analyses. Retailer trials are being conducted in both SCE and PG&E service territories. Feedback is needed by early 2011 in order to incorporate successful elements into the core ARP program. The budget for this component of the study includes a placeholder for ED involvement in study design and analysis of results.

In addition, the IOUs have proposed to conduct a comprehensive process evaluation of this program, along with an early feedback evaluation of the ARP "retailer trail" program

component. The goals of the process evaluation include assessing the effectiveness of program design, including the adequacy of rebate levels and the effectiveness of retailer training activities. The process evaluation will also assess the effectiveness of program marketing, including program benefits messaging, website usability, in-store promotions, outreach to landlords and integration with other IOU and non-IOU programs (e.g., Codes & Standards, HEER, LIEE, WE&T, EPA). The process evaluation will assess program implementation and delivery effectiveness, including evaluating whether or not the program accomplished its targeted and committed outcomes as stated in the Program Implementation Plans (e.g., improved satisfaction with program delivery timelines, program tracking data reliability improvements, etc.).

In addition, a comprehensive market assessment will also be completed for this program. This assessment will be designed to collect information needed to understand end user preferences, practices, decision criteria, etc. specifically as they relate to usage and disposal patterns for secondary appliances. In addition, the assessment will be designed to understand the structure and operations of appliance disposal and resale markets. Baseline measurements of standard practices for recycling program-qualified appliances will also be researched as part of this assessment. Finally, customer segmentation and emerging technology research will also be conducted to support future program design.

Because the core ARP program, as well as the "retailer trail" component, have been specifically designed in 2010-2012 to include strategies to reduce free ridership and improve overall realization rates, it will be important that all three of these study components (e.g., early feedback evaluation, process evaluation and market assessment) are highly coordinated with the impact evaluation activities carried out for measures targeted by this program.

In addition, the PPM for this program calls for measurements of saturation levels for appliances by age, size and efficiency. As such, this study will need to coordinate with the residential saturation study. Data related to this PPM will be collected as part of the residential saturation study, while the analysis and reporting on the PPM measurements will be included in the process evaluation.

Finally, overall awareness of the program will also be studied through coordinated research targeting the residential sector as a whole (e.g., general population surveys included within the AKA-B measurements study group).

**Comprehensive Process Evaluation and Market Assessment of Business Consumer Electronics (BCE) and Home Energy Efficiency Rebate (HEER) Programs**. This study includes research and analysis in support of both the BCE and HEER programs. Given the synergies across these two programs (e.g., market actor participation, marketing and outreach activities, etc.), the overall research effort has been combined into one study.

A key element of this study involves a process evaluation of both programs. The process evaluation will assess the effectiveness of education and training program components, including retailer education and training initiatives and online consumer training tools designed specifically for BCE. The process evaluation will also address program design effectiveness, including adequacy of incentive levels and the use of upstream, midstream and/or downstream delivery channels. Program marketing and outreach effectiveness will also be evaluated focusing on strategies corporate retailer partnerships, in-store promotions, outreach to sales and service teams, engagement of relevant industry groups and associations, and integration with other IOU and non-IOU programs (e.g., SCE's Online Buyers Guide, ARP, MFEER, Codes & Standards, Emerging Technology, ME&O, WE&T, LIEE, EPA, CEC, "Top Ten USA"). The process evaluation will also include an assessment of program implementation and delivery effectiveness, including accomplishment of program outcomes (e.g., level of retailer participation, POS customer data collection, program responsiveness and timeliness, etc.). Finally, the process evaluation will also focus on the effectiveness of program administration and management processes, including contact management, program documentation, rebate payment and retailer invoicing, etc.

This study will also include a market assessment component. Surveys will be conducted with market actors, residential consumers as well as business-to-business consumers to address program-specific AKA-B metrics. For the BCE program in particular, this study will include market research to further understanding of the structure and operations of target markets (e.g., market size, market players, product availability, etc.). Funding has been set aside to support ED involvement in this important component of the study. Data to support the measurement of PPMs will also be collected as part of the BCE and HEER market assessment research activities.

In addition, this study will be coordinated with residential sector saturation and market share tracking studies, providing baseline measurements (i.e., sales and penetration estimates). This study will also coordinate with overarching residential sector studies to provide measurements of AKA-B metrics. Finally, this study will utilize data collected from the overarching potential study, as well as any specific studies focused on plug load potential, and provide recommendations for program improvement and future program design.

**Home Energy Efficiency Survey (HEES) and Related Programs Process Evaluation.** This study involves research to improve programs designed to provide consumers with information to help them implement energy savings measures, as well as various marketing and outreach activities designed to provide similar information to specific segments and target markets. Specifically, this study will provide process evaluation results for the statewide HEES program, including the new "universal audit tool" program components, as well as local marketing and outreach programs such as SCE's Community Language Energy Outreach (CLEO) program and the Online Buyer's Guide.

The process evaluation of this group of related programs will include an assessment of program design effectiveness, including evaluating the comprehensiveness and implementation of energy audit recommendations. The process evaluation will include an examination of program delivery and implementation effectiveness, including the accomplishment of targeted and committed outcomes. Program marketing and outreach strategies will be assessed, including multi-language outreach, targeted segment participation (e.g., high-usage), hard-to-reach segment participation, cross-program participation, and messaging and delivery options (e.g., email, flyers, direct mail). The process evaluation will address how well the information provide through these programs was integrated with others IOU and non-IOU programs (i.e., HEER, Whole House, Emerging Technology, WE&T, CSI, AMI, LIEE, EPA, water saving programs, municipal programs, etc.). Budget has been set aside for ED oversight of and involvement in the design of research for assessing integration effectiveness, adoption effectiveness and best practices.

This study will coordinate with residential sector saturation and market share tracking studies to collect data on penetration rates. AKA-B metric measurements will be collected through coordinated research targeting the residential sector as a whole.

**Process Evaluation of Multi-Family Energy Efficiency Rebate (MFEER) and Comprehensive Mobile Home Program (CMHP) Programs.** This study involves the process evaluation of two separate programs, the Multi-family Energy Efficiency Rebate Program and the Comprehensive Mobile Home Program. The process evaluation of each program will focus on program design, delivery and implementation effectiveness, including the apartment audit tool, lead qualification process, maintenance staff training activities, measure and market actor diversification, quality control and participant satisfaction. In addition, the process evaluation will assess the effectiveness of program marketing, including targeted marketing efforts, marketing and outreach campaigns (e.g., telemarketing, field sales, direct mail, elevator announcements, website), and networking activities targeting various trade and industry organizations. The process evaluation will also include an assessment of integration effectiveness, including coordination with other IOU and non-IOU programs (e.g., codes & standards, WE&T, solar water heating, solar pool heaters, etc.). Finally, the process evaluation will coordinate with other studies (e.g., residential sector saturation and AKA-B measurement studies) to collect data needed to measure PPMs.

**Whole House Market Assessment and Process Evaluation**. This study will include a market assessment and process evaluation for the Whole House Program. The research to be conducted as part of this study should be carried out in phases. The first phase will involve the collection of information needed to establish important baseline measurements and provide early process evaluation feedback. Subsequent phases will include more indepth study of the program's design, marketing and implementation, as well as best practices and integration effectiveness

assessments. This study will be highly coordinated with other studies, including the residential sector potential, impact evaluation and measure cost studies.

**Moderate Income Direct Install (MIDI) Program Process Evaluation**. This study will include a process evaluation of the MIDI Program. Similar to the research conducted fo the Whole House Program, this study will be carried out in phases. The first phase will involve the collection of information needed to establish important baseline measurements and provide early process evaluation feedback. Subsequent phases will include more indepth study of the program's design, marketing and implementation, as well as best practices and integration effectiveness assessments. This study will be highly coordinated with other studies, including the residential sector potential, impact evaluation and measure cost studies.

**Residential New Construction Market Characterization and Process Evaluation.** This study is a Market Analysis of California's residential new construction market. The study will provide comprehensive market structure and decision making analyses for the manufactured housing market, the new multi-family construction market and the new single family construction market. The study will provide for detailed reporting on key submarkets and market processes, such as HERS raters and energy consultants, building design process, program participation, and appropriate segmentation and characterization of new home buyers.

For each major sector, the study will include broadly scoped and in-depth market characterizations as well as AKA-B measurement. The studies will also investigate program best practices and program design and implementation improvements. This will include the study of incentive structures, the optimal provision of non-incentive services, as well as strategies in marketing and outreach. Marketing and outreach research will include a close look at potential applications to the SCE Integrated Marketing and Outreach Program.

The studies will further investigate baseline building practices, efficient market share and remaining energy efficiency potential in each market, with a view ultimately to constructing an actionable roadmap for the cost effective achievement of *Strategic Plan* goals.

In addition, this study will provide an update to research conducted 2007-2008 which estimated costs associated with improved efficiency in single family new construction. The update will be in accordance with the final 2008 Title24 code (not available at the time of the original study) and will revise baseline building assumptions by climate zone, as appropriate.

**Evaluation of PG&E's OPOWER Pilot Program.** The goals of this study are to validate the methods being used to determine energy savings impacts from comparative energy use programs, including experimental design, sample frames, control group characteristics, random assignment and multivariate data analysis. In addition, the ex-post impact evaluation should be designed to determine energy savings for groups and sub-groups of the samples, as well as assess

persistence of energy savings overtime. Cost-effectiveness analyses should also be conducted for different customer groups to inform future program design. [Note: this study is not the ED-managed impact evaluation of this pilot program; ED and its contractors are providing input and oversight to PG&E's initial effort to design the experiment and select the samples. The full-scale evaluation of comparative use programs will be included in the custom impact evaluation scope.]

*IOU-Managed Nonresidential Studies*

There are five studies focused on nonresidential programs that will be managed by the IOUs. These studies are described below:

**Overarching Process Evaluation of All SDG&E and SoCalGas' Nonresidential programs.** Sempra has proposed to conduct independent process evaluations of the nonresidential retrofit programs included within the SDG&E and SCG portfolios. The primary goal of these studies is to assess the effectiveness of program design, program implementation and marketing activities. The studies will be designed to address process evaluation issues for all nonresidential retrofit programs, including statewide, local and third party. In addition to funding its own independent process evaluations, Sempra plans to provide a limited amount of EM&V funding for process/market studies being managed by PG&E and SCE to the extent that those studies will be collecting data/reporting on baseline metrics, PPMs, MTIs, etc.

**Process Evaluation of Nonresidential Retrofit Programs[11].** This study includes a comprehensive process evaluation of all nonresidential retrofit programs, including statewide, local, partnership and third party programs. The goal of the study is to assess the effectiveness of nonresidential retrofit program administration, design, implementation and marketing, with particular emphasis on adoption effectiveness, best practices and integration. Comparisons between and among nonresidential program design, marketing and delivery strategies will be a key element of this process evaluation. In particular, this study will address the effectiveness of different delivery strategies such as the different approaches taken within the nonresidential audit and direct install program components. In addition, the effectiveness of different financial assistance models, including the core calculated v. deemed incentive approaches and, in particular, the On Bill Financing approach. Best practices in program marketing and delivery will also be a focus of this evaluation, including ME&O strategies, project identification/screening processes, and whole building approaches. This evaluation will also include an assessment of benchmarking strategies and recommendations for best practices in this area. It will also be important to assess the effectiveness of nonresidential retrofit programs in integrating with the ETP program. Process evaluations of pilot, new and significantly modified programs (e.g., CEI, RCx, etc.) will also be included in this study.

[11] It is expected that SDG&E and SoCalGas will closely coordinate with and contribute to this statewide study.

**Energy Savings Calculation Tools Development for Existing Building Commissioning (EBCx) Program.** This study involves the review and development of energy savings calculation tools for common, low-savings EBCx (Existing Building Commissioning) measures. The tools are targeted for use on common measures with relatively low savings, which make up a significant portion of the EBCx measures identified during the 2006-2009 PECI RCx program but a small portion of the overall program savings. The tools are expected to help the program effectively target small to mid size buildings at lower cost, streamlining the participation process and still maintaining a sufficient level of program-wide rigor and consistency. All issues pertinent to the unfolding of these expectations will be investigated thoroughly. Moreover, new savings estimation procedures will be assessed for quality, consistency and effectiveness in both delivery and outcome. This study is nearly complete and utilized 2009 EM&V funding.

**Nonresidential New Construction Market Characterization and Process Evaluation.** This study will examine the market structure and decision making of the nonresidential new construction market. The study will provide market characterization and AKA-B measurement. It will also provide process evaluation of the Savings by Design program, identifying best practices and investigating new and enhanced program opportunities. Particular attention will be paid to the refinement of marketing and outreach strategies, with a focus on recruiting promising sectors, and improving the training of field representatives.

This study will characterize baseline building practices, market shares and remaining potential by ownership type and building type. It will leverage and build upon previous research conducted on program penetration and potential that was completed for the years 2004-2009. "

**ACEEE "Big Savers" Best Practices Study.** This is an IOU-funded "best practices" study designed to highlight how market actors have achieved large savings.

*Cross-Cutting Studies*

There are twelve studies focused on cross-cutting areas that will be managed by either ED and IOU (or in some cases, the management structure has yet to be determined). These studies are described below:

**Lighting Market Characterization and Process Evaluations.** This study includes several components focused on the Upstream Lighting Program, including basic CFLs as well as advanced lighting products. It also addresses the EM&V information needs for the Lighting Market Transformation (LMT) Program.

This study includes Phase 1 and 2 of the Advanced Lighting Baseline Study being managed by the IOUs. This study includes data mining from the 2006-2008 Upstream Lighting Program impact and process evaluations, as well as additional data collection including the purchase of

POS lighting sales data from commercial vendors. As such, this study will be closely coordinated with the residential market share tracking study.

In addition, this study includes a component designed to characterize the supply-side market for basic and advanced lighting products. This study will build from earlier research conducted by ED and the IOUs, as well as explore new distribution channels as indicated by the LMT Program and Emerging Technologies Program.

This study also includes a process evaluation component specifically focused on the LMT Program. The process evaluation will assess the success of the lighting technology roadmap in providing insight that that was effectively integrated into program design.

This study will be highly coordinated with impact evaluations focused on upstream lighting measures. In addition, this study will coordinate with the measure cost study. Finally, this study will be coordinated with AKA-B measurement research to track changes in the underlying lighting market conditions, including upstream, midstream and downstream perspectives.

**HVAC Market Characterization and Process Evaluation.** This study is comprised of several components. First, this study will build from work initiated in 2009 to mine existing data for insight about HVAC maintenance strategies to both inform current program design as well as the need for further research. A follow-up study is also proposed to fund the research recommended through this initial study. This follow-up study will likely include field measurements and laboratory research.

This study also includes two research components designed to develop deeper understanding of both end-user and market actor awareness, attitudes, wants and needs, and decision-making processes related to HVAC systems and measures. The research will be conducted in phases, with Phase 1 consisting primarily of a literature review and analyses of secondary data and Phase 2 involving primary data collection to fill critical gaps.

Finally, this study includes an overarching process evaluation of all HVAC programs and subprograms included within the 2010-2012 portfolio. The goals of the process evaluation are to evaluate the effectiveness of marketing strategies and incentives, contractor training and quality assurance, and trade industry networking. In addition, the process evaluation will include research designed to understand purchase decision making behavior and equipment supply and stocking considerations.

**Local Government Partnerships Program Process Evaluation.** This study will leverage LGP research conducted as part of other 2010-2012 EM&V studies. It will include case study comparisons of LGP models operating in different IOU service territories. Research issues will include an assessment of whether or not local government jurisdictions have experienced

capacity improvements and/or implemented permanent changes in energy efficiency policies and practices (e.g., as a result of participation in PGC-funded initiatives or other programs, such as federal or state programs, ARRA programs, etc.). In addition, this study will assess administrative costs across different program models, and identify factors contributing to success (or lack of success) in integrating with IOU programs.

**ME&O Program Process Evaluation.** This study will provide a comprehensive AKA-B study focused on providing a baseline for the measurement of the achievements of new ME&O campaigns. The scope of AKA-B baseline research must be consistent with objectives of ME&O campaigns. This work may leverage the 2010 Energy Conservation, Efficiency, and Demand Response Survey (ECEDR). This effort will include data collection spanning major California spoken languages and provide sector and IOU specific analysis results.

This study also provides an in-depth program delivery and implementation assessment. This assessment will focus on all stages of implementation, including the processes engaged in the design and development of brand and campaign strategies. Moreover it will assess specific AKA-B and adoption effectiveness outcomes resulting from of specific messaging and channel selection.

Another component of this study will focus on furthering development of evaluation methods that provide consistent and reliable measurement of program effects. As an extension of such research, this study component will identify related evaluation data requirements and program tracking best practices.

**WET and Related Educational Program Process Evaluations.** This study includes in-depth program delivery and implementation assessments of Workforce Education & Training programs. This component will provide rapid feedback to program management for programs in critical early stages of deployment. Evaluation scope will include a overarching effort to assess adoption effectiveness and best practices, leveraging measured outcomes across the full array of program strategies and markets. This component will also develop and refine logic models as needed.

This study will also have a curriculum development component. This component will provide recommendations, updates and refinements to training curriculum, leveraging the outcome of the statewide WET needs assessment. It will address previously identified recommendations for improvements to elementary school curriculum, as well developing enhancements for application to WET Centergies curriculum.

This study will include a component focused on the development of optimal evaluation methods, related data requirements, and best practices in program tracking. In addition to developing new

methods, and comparing known methods, this component will perform evaluability assessments for new or unique programs.

**ETP Process Evaluation and Market Assessment.** The ETP evaluation study will include program delivery and implementation assessment, program impact, as well as market structure and decision making elements.

One focus of this study is to ensure a balance of portfolio efforts during the initial stages of program planning. This will serve to support strategic plan objectives related to the promotion of specific technologies such as advanced HVAC, plug loads, advanced lighting and ZNE technologies. Balance also needs to be preserved between "proven" underutilized technologies with little market traction and "new" advanced technologies that meet Strategic Plan goals. Other key balancing factors include fuel types, end-use applications, and consideration of market potential.

The program delivery and implementation assessment component includes an update to the 2010-2012 logic models. It will examine closely the screening and selection criteria of candidate technologies, in particular for the Technology Assessments, Scaled Field Placements, Demonstration Showcases and Technology Development Support subprograms. This evaluation will consider the balance and selection process related to the selection of test sites, participants, climate zones and applications. This component of the evaluation also includes updating the ETP database to review tracking data quality and assess whether tracking methods adequately address evaluation and program management data needs. This assessment will confirm consistent naming and numbering conventions have been implemented, among other previously identified improvements.

The impact evaluation component of this study will be used to evaluate the extent to which the program objectives and key program outcomes have been achieved. In particular the evaluation will determine the degree to which the program contributed to increased measure awareness, market knowledge and reduced performance uncertainties for ETP stakeholders and IOUs' customers. Ultimately, the evaluation will determine if ETP contributed to increased technology supply and market traction and support the advancement of SP Big Bold Goals including ZNE. This evaluation study will also assess the estimated energy savings of the adopted ET measures into the EE portfolio.

The market assessment component of this study will include a market characterization component focused on the energy efficiency technology market. Among the primary objectives of this effort is the study of market actors and the competitive landscape. Emphasis will also be placed on research needs and the process by which these are articulated and filled.

**"Omnibus" IDSM Program Process Evaluation.** This study will include a program implementation and delivery assessment of the IDSM program. Objectives of this component include a review of related program pilots, with a focus on providing timely feedback. This component will include a best practices assessment that compares strategies and outcomes across programs incorporating integrated energy solutions, both within and outside California.

Market structure and decision making study focused on market actors and market processes central to delivery of integrated solutions. The study will develop new program strategies and identify opportunities that direct program resources toward the most cost effective strategic implementation of integrated solution support.

**Codes & Standards Market Assessment and Process Evaluation.** This study will provide a comprehensive analysis of the codes and standards markets in California. It will characterize the code compliance market, including documenting standard practices and key market processes in the context of market transformation and programmatic goals.

This study will also provide a program implementation and delivery assessment for the statewide codes and standards programs. This component will have a best practices assessment that studies strategies, outcomes and lessons learned in other jurisdictions. It will also include an in-depth process evaluation, incorporating a rapid feedback process evaluation for the Compliance Enhancement Sub-Program and the Reach Codes Sub-Program.

This study will have a methods component to develop and update evaluation methodologies for C&S programs. This will include the enhancement of NOMAD methods and the development of evaluation protocols for new or critical C&S subprograms. For select new or unique program strategies, methods research will focus on evaluability assessments (e.g. C&S data dictionary). Methods research will focus on baseline development and assessing the mechanisms governing market penetration of products governed by codes.

Finally, this study will include a component focused on lighting. In particular, this study will provide a statewide lighting energy use baseline characterization that covers indoor residential, indoor commercial and outdoor lighting sectors. Key study outcomes include the creation of a model of lighting energy use in California that will support scenario analysis for testing the projected savings of alternative program strategies. From this model, the Codes and Standards Program will be able to identify a code specific pathway to achieving the lighting use reduction goals established in AB 1109."

**ZNE Process Evaluation and Market Assessment.** This study will define an optimal pathway for the achievement of the CA Strategic Plan ZNE goals. This study will span all relevant sectors, including new construction and existing buildings. This study will focus on defining the required acceleration of codes and standards stringency, as well as supplemental programs,

policies or procedural strategies to ensure successful implementation. In particular, the study will consider expanding Title 20 and 24 to address all significant end uses and determine required improvements in the coordination of code development across local, state, and federal jurisdictions. This study will also provide the timely address of near term concerns, including but not limited to the appropriate treatment cost-effectiveness and compliance in the context of ZNE Standards.

This study includes a program delivery and implementation assessment component that has an early EM&V planning component. The IOUs will develop a plan to create and utilize ongoing and timely evaluation results to continuously improve integrated program offerings of the ZNE pilot programs. The early planning component will also detail the process evaluation of ZNE pilot programs, and a best practices assessment that will seek to integrate the lessons learned from programs with similar goals and/or designs. It will also propose additional study elements (or sub-studies) identified as critical to the creation of a statewide roadmap to achieve ZNE goals. As the evaluation progresses through the 2010-2012 cycle, additional ZNE strategic support studies will be proposed for the next program cycle (2013-2015).

This study will include a technical potential element focused on the assessment of building types with respect to their technical potential to achieve net zero-energy in the Commercial Sector.

This study will include a targeted market structure and decision making component. The focus of this element will be on markets and market processes on the critical path to achieving ZNE goals. This will identify and characterize primary market transformation barriers, and prioritize the need to address those barriers in the context of related costs, benefits and feasibility. Attention will be paid to key market actors and their perspectives within the context of relevant markets and service territories, and to developing ZNE market segmentation and differentiation at the local, sector and statewide level.

This research will seek new and enhanced program strategies in support of ZNE goals, which will supplement or improve the existing portfolio. This study should be coordinated carefully with related scope addressed in the C&S study, the new construction market studies, the IDSM study, and the ZNE potential, costs and goals sub-study.

**Early EM&V for All Programs.** This study area will include early EM&V research activities to be conducted by IOUs as a component of improving ongoing program performance (e.g., short turnaround research to support work paper updates). This study area could address research needs for any program, residential or nonresidential.

**SCE's Enhanced Inspection Study.** Process evaluation study focused on improving SCE's internal QA/QC and inspection procedures

**SCE's Catalina Island Program Improvement Study.** Study focused on gathering data for a pilot effort on how to reach this high-cost-to-serve area..

### *5.2.4 Budget*

A total of $17.8 million has been budgeted for 2010-2012 EM&V studies within the primary home of Program Delivery and Implementation Assessment. Based on a preliminary assessment of level of effort by EM&V research category, it is estimated that about 62% of the total EM&V funding for these studies will be directed at assessing issues related to Program Delivery and Implementation Assessment research topics. About 19% of the total EM&V funding for these studies will be directed at addressing Market Structure and Decision-making research topics. The remaining EM&V funding for these studies will be directed at addressing other research topics organized under different EM&V categories (e.g., Program and Measure Impacts, Planning and Policy, etc.).

### *5.2.5 Schedule*

Table 5-6 below summarizes the schedule and critical milestones related to Program Delivery and Implementation Assessment studies. Final reports will be completed by the end of the second quarter of 2013. Project planning will be completed before the end of the second quarter of 2011. Some studies may be conducted in phases such that project planning may continue even after the planning activities for the initial phase has been completed.

Key next steps include issuance of RFPs and the executing of contracts, as appropriate. Studies will provide early feedback memorandums providing timely feedback and recommendations, and/or to summarize key interim findings related to a study milestone such as results of professional interviews, participant surveys or the completion of a literatures review. Early feedback memorandums are expected to commence in the third quarter of 2011 and continue through the second quarter of 2012. Studies will provide quarterly results reports, which provide study updates and summarize findings and accomplishments for the quarter. Quarterly reports should begin the third quarter of 2011 and continue through the second quarter of 2013. Similarly, annual reports will summarize results over the previous calendar year, and are to be submitted before the end of the first quarter of 2012 and the first quarter of 2013.

**Table 5-6: Schedule for Program Delivery and Implementation Assessment EM&V Studies**

| Activity | 2011 | | | | 2012 | | | | 2013 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 |
| Start-up / Project Planning | X | X | | | | | | | | | | |
| Issue RFPs / Execute Contracts | X | X | X | X | X | | | | | | | |
| Implement Studies | | X | ...On-going... | | | | | | | X | | |
| Early Feedback Memos | | | X | X | X | X | | | | | | |
| Quarterly Results Reports | | | X | X | X | X | X | X | X | X | | |
| Annual Reports | | | | | X | | | | X | | | |
| Final Reports | | | | | | | | | | | X | |

## 5.3 Program and Measure Costs

### *5.3.1 Summary of EM&V Activity/Study Area*

This EM&V activity area will focus on verification and estimation of measure and program costs. Measure costs will be estimated using a variety of primary and secondary research techniques from data collected both from program records and the broader market place. Cost research will be conducted through both a stand-alone Measure Cost Study and, where efficient, necessary, and appropriate, through cost-related data collection and research conducted as part of other EM&V studies (e.g., impact evaluations, process evaluations, and market studies). This work will be conducted under the general direction of the Energy Division's DEER and energy efficiency cost-effectiveness teams. Costs will be developed to be incorporated into and, directly aligned with ex ante energy savings estimates within, the DEER database. Costs will also be estimated and analyzed to align with and support application in ex post program and portfolio cost effectiveness analyses. The CPUC's Audit Division will also conduct an audit of the utility program expenditures, as was done in the prior program cycles. This is done to ensure appropriate use of these public funds by the IOU's in implementing the programs.

### *5.3.2 Need and Application of Results*

Measure and program costs are a fundamental input into measure, program, and portfolio cost-effectiveness analysis. A number of CPUC energy efficiency policies require measure and program costs as a primary input into mandatory cost effectiveness analyses. Currently, the two primary tests used to inform energy efficiency policy making, including goal setting, portfolio cost-effectiveness requirements, and the risk-reward incentive mechanism, are the total resource cost test (TRC) and the program administrator test (PAC). The participant test and ratepayer

impact measure (RIM) test are also sometimes used to provide additional information and perspective on efficiency measures, programs, and portfolios. The total resource cost test (TRC) requires program costs, incentive costs, and participant costs. Program costs and incentive costs are the two principal cost elements for the program administrator test (PAC).

Program and incentive costs have proven to be more easily and directly observable than measure costs. Measure costs, particularly incremental measure costs, are not always directly observable for reasons discussed below. Consequently, measure costs must often be estimated using a variety of research approaches that vary depending on the measure, market, and sometimes program application in which they occur. Estimation of measure costs has been of fairly limited scale historically, particularly as compared to efforts and expenditures associated with estimation of energy savings. Measure cost studies were conducted in California in 1992, 1994, 1996, 2001, 2005, and 2009. Most of these studies were moderately funded at roughly $200,000 for the first four studies and $500,000 for the last two. While the CPUC, CEC, and California IOU's have conducted more measure cost studies since 1992 than any other jurisdiction, total expenditures on such cost studies over the past two decades have nonetheless been likely 100 times less than expenditures on energy savings-related evaluation and research studies. That is not to say that measure cost studies require commensurate resources as energy impact studies, but it does indicate that there likely has been an under investment in this area given the relative importance and challenges associated with cost estimation. In addition, given the lower overall portfolio cost-effectiveness levels of recent years, improving confidence in the accuracy of measure costs is increasingly important.

The studies to be conducted will provide the CPUC and IOUs with improved estimates of measure costs to support fulfillment of CPUC policy requirements.

### *5.3.3 General Approach, Issues, and List of Studies and Activities*

This activity area will utilize both program and market data to verify and estimate full, incremental, and lifecycle measure costs. In addition to estimation of costs associated with common individual measures, technologies, and services, this activity will also consider research on verification and estimation of costs associated with custom and whole-building oriented efficiency projects, areas for which there has been little to no empirically-based cost estimation in the past.

***Limitations of Invoice-Only Cost Data***

Measure costs are important because they are a critical input to energy-efficiency program cost-effectiveness analyses. At first glance, measure costs may seem to represent simple, easy-to-obtain, empirical data which should be readily available from utility program records. Although that is sometimes the case for a few measures, it is not the case for most. There are a number of -limitations to the value of cost data available through normal program participation processes.

Invoices associated with program records are often not directly useful for accurate estimation of measure costs because of the following:

**Invoice data is not available, or readily accessible, for all program-funded projects.** Utility and third-party programs do not require invoice data for all projects. In addition, in many cases where invoices are required, they are not routinely scanned and made easily available in electronic format. It is difficult to obtain invoice data as part of programs that do not provide financial incentives, since this information is often considered proprietary. It often takes the inducement of incentives to successfully require project invoice data. This often limits the availability of invoice data to those programs with significant financial incentives.

**Project invoices typically bundle both equipment and labor costs. Most contractors bundle equipment and labor costs in both their bids and their invoices**. This is typical practice in most equipment and building trades and not one that can be easily undone. Experience has shown that even when a utility requires vendors that participate in a program to unbundle their invoices into equipment and labor costs, the unbundling is often done in a haphazard or generic way after the invoice is generated. Without accurate separation of equipment versus labor costs, invoices are of reduced value to estimation of incremental measure costs.

**Project labor costs are highly variable and difficult to normalize and isolate**. As anyone who has obtained multiple bids for a major piece of equipment or renovation project in their own home can attest, labor costs can be highly variable even for jobs that appear to be well specified. For a particular project, estimated labor charges may vary based on different contractors' availability (e.g., opportunity costs), their perceptions of the customer's willingness (or ability) to pay, their ability to assess the extent of the work required, as well as a host of other factors. Across projects, the factors influencing variation in labor costs only multiply and are difficult to control for on an ex post basis (e.g., costs of removing existing equipment, ease of access to equipment, costs of getting to the job site, etc.).

**Project equipment costs also are variable and difficult to isolate and normalize**. Although typically somewhat less variable than labor costs, equipment costs can also be highly variable. One of the key factors affecting equipment price variation as it relates to typical invoice data is that there are often a multitude of dimensions that affect price but are excluded from invoice documentation. Consider, for example, the case of compact fluorescent lighting systems (CFLs). There are a number of underlying attributes of CFLs that may affect their prices, including, but not limited to ballast type (electronic or magnetic), whether they are integral or modular, adapter type (screw-in versus hard-wired), wattage, inclusion of a reflector, whether Energy Star, and whether sold in a single or multi-pack. Invoices rarely provide documentation at this level of equipment specificity and, hence, are sometimes of limited value in estimating specific rather than generic measure costs.

**Project invoices are generally more useful for estimating the full costs of retrofit measures than they are for estimating the incremental costs associated with measures installed in new construction or on a replace-on-burnout basis**. Invoices typically provide cost data only for the energy-efficient project implemented; in the vast majority of cases they do not provide any data on the costs of any base case (usually standard efficiency) equipment considered. For example, an invoice may be available for a project on which a high-efficiency 5-ton air conditioning unit with an SEER of 15 was installed; however, the invoice typically provides no information on what the cost would have been for a project involving a unit of standard efficiency. As a result, the invoice cannot by itself be used to estimate the incremental measure cost.

***Approaches to Measure Cost Data Development and Estimation***

Through past measure cost study efforts, a number of lessons learned have been developed on what works well and what does not with respect to cost data collection, estimation, and integration with energy savings, EUL, net to gross and related cost-effectiveness parameters.

There are a number of significant challenges to the collection of accurate cost data including private market actors' reluctance or refusal to provide what they believe to be proprietary data, limitations of invoice data (as discussed above), and difficulty determining technology market shares to appropriately weight results, among others. Because of the large number and variety of technologies and measures included in utility program filings, no single data collection and analysis strategy is suitable for developing accurate cost data. Instead, different data collection strategies must be appropriately matched to the unique estimation challenges that each technology, measure, and program presents. The suite of data collection approaches will include:

- Cost surveys of manufacturers and wholesalers;
- Cost surveys of retailers;
- Cost surveys of contractors;
- Cost surveys of the Internet;
- Cost surveys of program implementers;
- Cost records from program databases, project files, and project invoices; and
- Secondary sources.

Once representative cost data are collected, several types of analyses will be conducted, depending on the type of technology, to develop final estimates of full and incremental costs. Simple averages can be calculated and, in some cases, these averages can provide the best estimate of the costs of baseline and high-efficiency technologies. In other cases, however, using the average cost is likely to lead to errors because the averages will not control for important

differences between base case and high-efficiency technologies. In addition, where sample sizes are small, use of the average price may be significantly biased by data inconsistencies and incompatibilities. Another problem with comparing the average "base" technology price to the average "high-efficiency" technology price has to do with whether the sample of sources is identical for both cases. That is, if there is not a *matched pair* of costs for the base case and high-efficiency option from every source, the difference in the averages could be significantly biased due to differences in price levels between the sources that have nothing to do with energy-efficiency levels.

To minimize the effects of such potential biases, individualized cost analyses must be conducted for every measure. In addition, where large enough samples are available, regression models will be developed (these regression models are sometimes referred to as *hedonic price models*). In cases for which such models cannot be used effectively, the raw cost data will be analyzed directly to determine if there are any significant biases in the average cost estimates. In these cases, average incremental costs using only matched pairs of base case and high-efficiency technology costs obtained from the same sources will be used. When the principal raw data are collected at the manufacture or wholesale level, then an informed estimate of the typical markup applied by contractors or retailers, as appropriate, will be made and applied to develop the final estimates of end-user level costs.

In summary, raw cost data will be analyzed using one of four different analytic methods, including:

- Simple average: The simple average method takes all cost observations for a particular measure and averages them. Incremental costs are then calculating from the differences between baseline and high efficiency technologies. The results of such simple average are only meaningful with highly uniform technologies with few cost-varying features.
- Weighted average: The weighted average uses one or more observed market variables (market share of a particular model or technology, cost based on specific volume purchase, etc.) to derive the average cost. Again, incremental costs are then calculated from the differences between technologies.
- Regression cost model: Regression models use relevant performance and other cost-influencing features as independent variables to estimate technology costs. These models isolate the incremental costs of efficiency related features. Regression models require relatively large sample sizes as compared to the other methods. Regression models have been used successfully in previously measure cost studies for a variety of mass market technologies (e.g., refrigerators, CFLs). Regression models have also been used successfully to normalize costs for technologies with a wide variety of features and sizes (e.g., for air conditioner tonnage).

- Custom cost estimates: This approach is typical of engineered and/or technically complex types of measures. Custom cost estimates will be employed where a unique equipment or system configuration needs to be defined by the project team and a cost estimate must be built up for the specific technical details of the technology. This approach is necessary for technologies with many features, custom applications, limited numbers of manufacturers and distributors/retailers, such as chillers, some refrigeration systems, and industrial process technologies. This approach may also be necessary for technologies or combinations of technologies that are relatively new to the market and have limited market share and available data (e.g., this may be the case with zero net energy buildings).

In addition to data collection and analyses focused energy efficiency-related baseline and high efficiency technologies and services, cost studies will also be conducted, as necessary and appropriate, on program costs and services. This is particularly important for energy efficiency measures that are an integrated part of the program delivery mechanism; that is, for measures for which the program itself defines the measure (rather than the general marketplace) or for which the program is likely to have a significant effect on the measure cost (e.g., quality HVAC and direct installation programs).

There has been little analysis conducted of the actual incremental costs of large non-residential custom energy efficiency and whole-building projects. Rules of thumb, such as assuming that incentives represent half of incremental costs, have been used in the past as proxies. In addition, there is often inadequate financial analysis conducted on large custom projects to determine what portion of the customer's financial investment threshold is associated with the energy savings of particular projects versus non-energy factors such as increases in production and reductions in labor, materials, and regulatory compliance costs. Further research is needed on custom incremental measure costs, especially for the projects with the largest incentives.

*Measure and Program Cost Studies and Activities*

As shown in the table below, measure and program costs will be developed through a combination of a stand-alone measure cost study and a measure and program cost data collection activity area. The latter activity area will focus on capturing cost data collection economies of effort through other EM&V studies such as impact evaluation, process evaluation, market studies, and potential studies. These data will generally be provided to the Measure Cost Study team for analysis, although in some cases the Measure Cost team may direct the other study team to conduct a specific measure cost analysis. For example, cost analysis of large custom projects can be incorporated into the early EM&V impact evaluation activity for custom projects. All of the cost-related data collection and analysis efforts will be conducted under the direction of the DEER and Energy Division cost-effectiveness analysis teams.

| Study/Activity Name | Sector(s)/ Segments/ Programs/ Measures | Objectives | Summary Description | Key Activities | Budget | Priority | Primary/ Secondary Lead (ED - IOU) |
|---|---|---|---|---|---|---|---|
| Measure Cost Study | All | Develop full, incremental, and lifecycle technology and measure costs | Conduct comprehensive measure cost study. Coordinate and integrate cost estimates with DEER database and CPUC cost-effectiveness analysis | • Define technologies and measures w. DEER and ED-IOU reporting teams<br>• Primary data collection<br>• Estimate baseline and efficiency technology costs<br>• Estimate measure incremental costs<br>• Incorporate in DEER database | $2,000,000 | High | Energy Division |
| Measure and Program Cost Data Collection | All | Collect program and technology cost data | Collect cost data as part of other EM&V studies, e.g., impact and process evaluation, market, and potential studies | • Collect cost data under direction of DEER and ED-IOU reporting teams<br>• Collect program costs by activity area<br>• Collect cost data from programs (e.g., invoices)<br>• Database cost and invoice data<br>• Conduct additional cost wrk as requested | $500,000 | High | Energy Division |

### *5.3.4 Budget*

$2,500,000

### *5.3.5 Schedule and Key Next Steps*

| | 2011 | | | | 2012 | | | | 2013 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 |
| Project Initiation | X | | | | | | | | | | | |
| Research Plan | X | X | | | | | | | | | | |
| Data Collection | | X | X | X | X | X | | | | | | |
| Data Analysis | | | | X | X | X | X | X | | | | |
| Cost Data Results | | | | | | X | | X | | | | |
| Documentation & Report | | | | | | X | X | X | X | | | |

# 6

# Portfolio Analysis

## 6.1 Portfolio Strategy and Management Assessment

### *6.1.1 Summary of EM&V Activity/Study Area*

This activity area will address the managerial and strategic aspects of portfolio implementation with a focus on assessing the costs, resources, and effectiveness of the enterprise. Research will focus on management structures, implementation systems, work flow management procedures, staffing levels by implementation area and need, expenditure and accomplishment tracking, use of information technology and other performance enhancement tools, staff hiring and incentives, time allocation and tracking, as well as other needs as identified through the EM&V needs assessment process. This activity will be supported by other related EM&V activities, such as those associated with verification and estimation of *Portfolio Costs* and *Program and Measure Costs* and evaluation of *Program Delivery and Implementation.*

### *6.1.2 Need and Application of Results*

Many of the Commission's fundamental public interest and oversight responsibilities are not fully or adequately supported by conventional program evaluation and related research projects alone. The Commission recognized this need by formally adopting, in Decision 09-09-047, financial and management audits as a core regulatory activity to be funded through the EM&V budget and performed as part of the EM&V effort.

> "*Financial and Management Audit* - Supporting the Commission's oversight function of ensuring the efficient and effective expenditures of ratepayer funds within the utilities' energy efficiency portfolios is another objective of EM&V activities. Rigorous financial and management audits overseen by Commission staff will be critical in ensuring that the utilities' general and administrative costs and other program expenditures are prudent and reasonable."[1]

In addition the Commission has emphasized the importance of evaluating the entire portfolio of energy efficiency activities with respect to the Commission's overarching goals of achieving

[1] Decision 09-09-047 (http://docs.cpuc.ca.gov/PUBLISHED/FINAL_DECISION/107829.htm)

significant cost effective energy efficiency savings and progress toward the long-term strategic plan and market transformation goals.

Overall portfolio cost effectiveness decreased in the 2006-2008 cycle, as compared to historic levels, and was projected to continue to be below historic levels in the 2010-2012 program cycle. Some of this decrease in cost effectiveness may be associated with increased costs of capturing energy efficiency due to factors outside of the program administrators' control, while some portion may be controllable with more efficient administration. The intent of the portfolio strategy and management assessment activities is to provide policy makers and management with better information to help develop efficiency policy, make organizational improvements, reduce costs while maintaining savings, and improve portfolio cost effectiveness.

This information will be a narrative description of the organizations responsible for managing the energy efficiency portfolio; a description of the operations and procedures employed by these organizations; and a strategic review of portfolio management to identify opportunities for improvement in efficiency of the overall implementation of the portfolios, as well as identification of practices to continue, enhance, and replicate. This study will be closely coordinated and integrated with, where effective and appropriate, the *Portfolio Costs* study. Where possible, this assessment will present this information in a comparative context, such as comparing the organizational practices to other organizations and/or model management systems. Recommendations for improving administrative efficiency and cost effectiveness will be provided as well as summaries of successful strategies that should continue or enhance.

### *6.1.3 General Approach, Issues, and List of Studies and Activities*

This activity area will be composed of one or more discrete activities, depending on the level of effort and skills sets required, to conduct the assessments with each IOU.

The primary focus of the studies will be on the utility organizations responsible for administering the energy efficiency portfolios. This assessment will be done by external contractors with primary expertise and experience in conducting management audits and organizational assessments. ED and the EM&V prime contractors will recruit management consultants with knowledge and experience in the applicable technical areas, such as the utility and energy sectors, public utilities regulation, energy, energy efficiency, and public benefit programs. If needed, the management consultants will have access to advisory expertise within the ED staff, EM&V Consultants, and EM&V Prime Contractors to ensure that the management consultants thoroughly understand the business and regulatory environment within which the EE portfolios are managed.

The assessment will consist of an examination of the following areas, among others to be determined during the research planning stage:

- Management systems, procedures, decision making processes and procedures, and priority setting.
- Organization structure, staffing needs, staffing levels, cost tracking systems, methods, and management, staff and management incentives (e.g., bonus structures), etc.
- Portfolio best practices and benchmarking; including with respect to the Commission's energy efficiency savings and long-term strategic plan and market transformation goals.
- Influence and role of policies on the mix and emphasis of different programs and measures, costs, organizational structure, and internal incentives.
- Company and program policies, adherence to internal and external policy requirements.
- Staffing, hiring, retention, training, and talent maximization.
- Use of information technology.

### *6.1.4 Budget*

$3,000,000

### *6.1.5 Schedule and Key Next Steps*

| | 2011 | | | | 2012 | | | | 2013 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 |
| Project Initiation | X | X | | | | | | | | | | |
| Research Plan | | X | | | | | | | | | | |
| Research, Interviews and Data Collection | | | X | X | X | X | X | X | | | | |
| Analysis | | | | X | X | X | X | X | | | | |
| Interim and Final Results | | | | | | X | | | X | | | |
| Documentation & Report | | | | | | | | | X | | | |

## 6.2 Portfolio Impacts

### *6.2.1 Summary of EM&V Activity/Study Area*

This activity area will focus on integration and estimation of portfolio impacts by directing and drawing on the results from other EM&V activity areas and studies, such as those performed by the Program and Measure Impact, Program Delivery and Implementation Assessment, and Market Analysis research areas. Additional stand alone studies will be developed as needed to

address any gaps in the EM&V portfolio or integrate results across studies. The intent of this activity area is to assess and compile estimated portfolio impacts, inclusive of direct impacts and any reliable estimates of indirect impacts, market effects, and market transformation. This study area will also provide guidance on impact estimation methods and policies to ensure consistent estimation of impacts across individual studies. All individual measure and program impacts will be compiled to produce estimates of portfolio impacts.

### *6.2.2 Need for and Application of Results*

This EM&V activity area is required to ensure that the portfolio of IOU energy efficiency activities is evaluated and assessed comprehensively, as required by CPUC policy as well as evaluation best practices. The range of different program intervention strategies, CPUC EM&V goals, and specific EM&V information needs necessitates the use of a variety of individual research strategies and studies as reflected in this 2010-2012 EM&V plan. Although every effort has been made to design and group these individual studies to capture all of the critical measure, program, and market effects, there remains an important need to strategically direct and integrate the results from these research efforts from a portfolio-wide perspective. The intent is to minimize gaps and maximize the comprehensiveness, accuracy, and value of the individual impact activities for application in the Energy Division's final estimation of 2010-2012 portfolio impacts, costs, and cost effectiveness (see *ED Reporting* activity area).

### *6.2.3 General Approach, Issues, Studies/Activities*

***Overview***

Most of the intensive data collection and analysis work associated with specific measures and interventions will be done in the program, measure, and market analysis EM&V activity areas and associated individual studies. The portfolio impact area will focus on providing strategic and tactical direction for the data collection and analysis activities in those studies and on integrating and synthesizing the results across measures, programs, and markets.

This activity area will also focus on continuous examination of whether there are any remaining high-priority gaps across the individual impact evaluation and market analysis areas. Any priority gaps identified will be addressed through development of additional data collection and analysis activities which will be assigned to the most appropriate EM&V activity area or addressed through the development and implementation of new studies.

This activity area will also provide analysis and direction associated with estimation of impacts that cut across individual measures, programs, and portfolio cycles; for example, providing guidance and tools for consistent estimation of:

- cumulative and lifecycle net and gross impacts (including indirect);

- market transformation, market transformation indicators (MTIs), program performance metrics (PPMs), and market effects;
- impacts as compared to goals;
- incremental impacts as compared to load forecasts;
- greenhouse gas impacts;
- impacts by geographic region; and
- grid impacts, among others.

Studies, white papers, and guidance documents will be identified and directed as needed to support the delivery of impact results that can be integrated consistently to produce comprehensive, portfolio-wide impacts.

The portfolio impacts area will work closely with the *Portfolio Cost* and *Portfolio Strategy and Management Assessment* areas to ensure consistency between cost and impacts and resulting cost effectiveness calculations.

***Market Transformation and Market Effects Analysis Element***

The area will focus on research associated with Market Transformation and Market Effects. Note that this research may be exploratory and even qualitative in nature and is not intended to be predicated solely on quantification of impacts associated with program and non-program market interventions.

Market Effects Analysis refers to the integration and synthesis of market data for the purpose of understanding the market effects of the state's energy efficiency programs. Market effects have been defined in the California Protocols as:

> "A change in the structure of a market or the behavior of participants in a market that is reflective of an increase in the adoption of energy efficient products, services, or practices and is causally related to market intervention(s)." (Protocols, page 144, after Eto, Prahl and Schlegel, 1996.)

Market Transformation is defined in the Protocols as:

> "A reduction in market barriers resulting from a market intervention, as evidenced by a set of market effects, that lasts after the intervention has been withdrawn, reduced, or changed."

Central to the activity of Market Transformation and Market Effects Analysis thus defined is the concept of *attribution:* assessing the role of energy efficiency programs or other related market

interventions in *causing* observed market changes. Market Effects Analysis serves a range of purposes, including:

- Helping further pursuit of the market transformation-related strategic objectives in the California Energy Efficiency Strategic Plan (CEESP), by developing insights regarding which programs (or sets of programs) are having which market effects. Without such insights, it would be difficult to effectively pursue the CEESP strategic objectives, as it is difficult to optimize the effects of one's actions without having some idea of which actions are having which effects. This is perhaps the single most important function of Market Effects Analysis.
- Complementing the "top-down," macro-level collection and analysis of market data that is occurring in several other activity categories with "bottom-up" analyses of the effects of programs on specific markets. Studies of saturation, macro-consumption, and many Market Transformation Indicators (MTIs) all tend to provide an overall picture of the global effects of California's energy efficiency programs, without regard to the specific market mechanisms through which these effects are occurring. Market Effects Analysis is intended to fill in the picture by clarifying the specific mechanisms through which long-term program effects are being achieved and improve understanding of attribution.
- Potentially helping to measure portfolio-level impacts, by quantifying savings from market effects that may not be quantified through other means. These types of portfolio level impacts make up a portion of the "Total Market Gross" goals for the IOUs future portfolios.
- Potentially helping to support Future Risk/Reward Incentive Mechanisms (RRIMs), to the extent these are specifically structured to incentivize the achievement of specific market effects or savings from market effects. [2]

The Market Effects Analysis will be primarily an integrative function, drawing on data collected under a number of other activity categories to reach conclusions regarding market effects. Other relevant EM&V activity categories to be drawn on include:

*Energy Consumption, Saturation & Market Share*. Because these are key indicators of the status of energy efficiency markets, data and findings regarding energy consumption and efficient market share and saturation are often critical inputs to market effects analyses.

*Market Structure and Decision-Making.* By describing current market characteristics such as end-user attitudes, knowledge and awareness, vendor preferences and practices, and the structure

[2] The inclusion of the Market Effects Analysis category in this workplan is not premised on future RRIMs being based on market effects. As discussed above, Market Effects Analysis serves other important functions.

and operations of target markets, this activity category too can often provide key data inputs for market effects analysis.

*Measure and Program Impacts.* Some impact evaluation methods, such as quasi-experimental comparisons of measure adoption in program and non-program areas, are closely related to Market Effects Analysis because they are inherently focused on surveying current market conditions. Other impact evaluation methods are less focused on the conditions of the market as a whole, but still feature surveys or interviews with market actors that can be leveraged to help support the analysis of market effects.

*Process Evaluation.* By clarifying the near-term behavioral responses of both end-users and upstream market actors who come into contact with programs, process evaluation can lay the groundwork for assessing whether programs are leading to the kinds of broader behavioral changes that can lead to market effects. In addition, the process evaluations will address the program logic models that are important for understanding program influences and attribution.

However, market effects analysis should not wait for the completion of the above studies. In fact, market effects analyses should be designed early on in order to influence the design of these other studies so that data can be collected efficiently and effectively, thereby minimizing the duplication of similar efforts.

In addition to the core function of integrating market data from the above sources to provide insights into market effects, other research activities encompassed by Market Effects Analysis include:

- Prioritizing the markets for which market effects are to be analyzed.
- Framing hypotheses regarding the specific mechanisms by which market effects may be occurring.
- Providing input into other EM&V activity categories to enhance their usefulness in helping to support the assessment of market effects.
- Conducting primary data collection where needed to support planned market effects analyses but cannot readily be collected through other EM&V activity categories.

### *6.2.4 Budget*

Portfolio Impacts - $2,000,000

Market Effects - $2,500,000

### *6.2.5 Schedule*

| Activity | 2011 | | | | 2012 | | | | 2013 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 |
| Project Initiation | X | | | | | | | | | | | |
| Research Plans | | X | | | | | | | | | | |
| Data Collection and Interim Reporting | | X | X | X | X | X | X | X | | | | |
| Data Analysis and Final Report Preparation | | | | | | | | X | X | | | |
| Final Portfolio and Market Effects Results | | | | | | | | | X | | | |

## 6.3 Portfolio Costs

### *6.3.1 Summary of EM&V Activity/Study Area*

This activity area will focus on investigating the expenditures allocated for the management and implementation of programs and costs associated with overall portfolio administration, including general, administrative, and overhead. The portfolio costs study area will conduct a compliance review of the utilities' financial operations, evaluate the overall use of energy efficiency expenditures, and provide recommendations for improving the financial systems and related policies. It will also assess the extent to which the IOUs have made progress with respect to addressing previous recommendations from CPUC financial audits related to energy efficiency expenditures and associated tracking and reporting requirements and expectations.

### *6.3.2 Need and Application of Results*

In Decision 09-09-047, the Commission stated that one of its objectives for EM&V is rigorous financial and management audits that evaluate the utilities' general, administrative, and program expenditures. As the budget for the energy efficiency portfolio has grown in recent years the cost-effectiveness of the entire portfolio has decreased. Consequently, it is increasingly important for the Commission to direct greater EM&V resources to a thorough analysis of the cost side of the benefit/cost equation for the purpose of identifying ways to make the portfolios more cost-effective. The portfolio cost study results will provide the Commission with validation for those areas where the funding was used prudently and effectively, and will provide the Commission with information that identifies areas where improvements can be made.

### *6.3.3 General Approach, Issues, and List of Studies and Activities*

The CPUC Utility Audit, Finance and Compliance (UAFCB) and Energy Division, with the support of financial auditing consultants, will investigate the financial records of each utility's energy efficiency operations for accuracy, completeness, consistency with Commission policy and adherence to standard accounting practices. Taking a step beyond the typical compliance audit, the portfolio costs investigation will evaluate the extent to which the utilities are cross-subsidizing utility activities that might be considered an inappropriate use of energy efficiency expenditures. Similarly, the portfolio costs investigation will evaluate whether the utilities are effectively using Commission authorized energy efficiency funding and will provide recommendations for improving the effective use of the authorized funds. The portfolio costs work will be closely coordinated with the *Portfolio Strategy and Management Assessment* area, as well as ED cost effectiveness analysis and data development.

### *6.3.4 Budget*

$3,000,000

### *6.3.5 Schedule and Key Next Steps*

| | 2011 | | | | 2012 | | | | 2013 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 |
| Project Initiation | X | X | | | | | | | | | | |
| Audit Plan | | X | | | | | | | | | | |
| Research, Interviews and Data Collection | | | X | X | X | X | X | X | | | | |
| Analysis | | | | X | X | X | X | X | | | | |
| Interim and Final Results | | | | | | X | | | X | | | |
| Documentation & Report | | | | | | | | | X | | | |

# 7

# Market Analysis

## 7.1 Energy Consumption, Saturation, Market Share

### *7.1.1 Market Analysis: Macro Consumption Studies*

***Summary of EM&V Activity/Study Area***

Macro consumption studies are part of the Market Analysis (Level 2) sub-group of the Program, Portfolio, and Market Assessment (Level 1) activities. Under the direction of the Energy Division, the study area activities will include the development of a set of white papers that explore a range of alternative, "top-down" evaluation methodologies; implementation of one to three pilot studies to test the cost, precision, and EM&V value of selected "top-down" approaches using existing data; and finally, if the results from one or more of the pilot studies prove to yield valuable EM&V information, implementation of a full-scale, highly customized "top-down" evaluation infrastructure (including both modeling platforms and data collection systems) that could be used on a regular basis by Energy Division and the CPUC for a variety of both EM&V and strategic planning purposes.

***Need and Application of Results***

In the CPUC's 2010-2012 EM&V decision, the CPUC directed Energy Division to assess, explore, and test the viability of measuring the reduction in energy consumption due to the various energy efficiency programs and efforts in California from aggregate consumption data.[1] The CPUC is interested in exploring evaluation methodologies that are more explicitly aligned with the CPUC's desire to gradually shift away from goals and programs based primarily on promoting efficient end-use systems and towards goals and programs based on whole-building reductions and market transformation targets that result in the reduction of total electricity and natural gas consumption in California, in absolute terms, over the long-term.

The total impact of individual energy efficiency efforts is uncertain without measuring changes in the performance of the whole system and actual, total energy consumption. One of the key uncertainties associated with savings based on one-off field studies is that the actual energy

[1] *Decision on Evaluation, Measurement and Verification of California Energy Efficiency Programs*, Decision 10-10-033, October 28, 2010.

performance of an energy efficiency measure does not always align with the initial specification of the intervention, especially over time. Some of the factors that contribute to these differences between theory and reality are changes to the larger energy-using system that alter the energy savings properties of the installed measure and the lack of skilled labor necessary to ensure high-quality installation and maintenance of energy-using equipment over time, among a number of other factors. In this respect, alternative "top-down" evaluation approaches that use more aggregate (or "macro") data on actual sales to quantify the total impact of energy efficiency programs therefore hold significant theoretical appeal. Additionally, since "bottom-up" EM&V studies are typically multi-year studies that involve significant primary data collection, alternative "top-down" evaluations approaches are potentially less time and resource intensive and could be used to strategically supplement, or possibly supplant, current "bottom-up" EM&V studies.

In addition to the evaluation-related applications of such "top-down" approaches, the CPUC is also seeking to harmonize estimates of total load reductions from future energy efficiency programs (as reflected in the CPUC's long-term energy savings goals) with the CEC's load forecasting efforts and their application in CPUC procurement proceedings.

***General Approach, Issues, Studies/Activities***

Under the direction of the Energy Division, the study area activities will include the following three studies: 1) development of a set of white papers that explore a range of alternative, "top-down" evaluation methodologies, 2) implementation of one to three pilot studies to test the cost, precision, and EM&V value of selected "top-down" approaches using existing data, and 3) contingent on the results of the pilot study, implementation of a full-scale, highly customized "top-down" evaluation infrastructure (including both modeling platforms and data collection and analysis systems) that could be used on a regular basis by the Energy Division and the CPUC for a variety of both EM&V and strategic planning purposes.

***Macro Consumption White Papers.*** This study activity will focus on the development of a set of parallel white papers by 3-5 teams of leading economists and researchers that explore and assess a range of alternative, "top-down" evaluation methodologies from a variety of perspectives relevant to the CPUC's needs. Researchers will be allowed to explore any approach that quantifies or identifies the presence of the effects of energy efficiency programs by assessing linkages between program activities and the level of aggregated electricity or gas use by consumers in the eligible population, including cross-sectional studies, time series analysis, case study approaches, or combinations of methods.

The scope of the white papers will include a comprehensive review and assessment of possible top-down evaluation approaches (and other related studies as deemed appropriate) that have been or could be used to assess the load impacts of energy efficiency programs, including

identification of meaningful energy intensity, structural, and behavioral indicators for different sectors of utility end-use customers. For each alternative approach, the white papers will assess and describe the pros, cons, and tradeoffs of each including data requirements, time and resource requirements, precision, and sources of uncertainty. Finally, the white papers will also include recommendations for specific top-down evaluation approaches that would appropriately supplement and add value to the CPUC's existing bottom-up EM&V and planning activities and provide a detailed proposal to conduct a pilot study to implement the authors' preferred approaches using existing data (including data that could be developed from existing data sources).

***Macro Consumption Pilot Studies.*** Based on the assessments and recommendations provided in the white papers, one to three proposed pilot studies will be chosen for "proof of concept" implementation and demonstration using existing data sources in California. The results of the pilot studies will be evaluated by the Energy Division and stakeholders through a series of public workshops and presentations with respect to the value of EM&V-related information derived from the pilot studies, the relative cost and ease of implementation, and the potential to be expanded and improved using new primary data. These pilot studies will produce recommendations and an assessment of pros and cons of pursuing subsequent full-scale and ongoing studies inclusive of any primary data collection requirements.

***Full-scale Implementation of Macro Consumption Approach.*** If the Energy Division and stakeholders conclude that the results of the pilot studies demonstrate sufficient value added to the CPUC's portfolio of EM&V and strategic planning activities, the final study activity will involve the development and implementation of a full-scale, highly customized "top-down" evaluation infrastructure (including both modeling platforms, data collection and analysis systems) that could be used on a regular basis by the Energy Division and the CPUC for a variety of both EM&V and strategic planning purposes. The design and implementation of this infrastructure should leverage other market and baseline data collection efforts administered by the Energy Division, the IOUs, and the CEC as much as possible, as well as program tracking and reporting processes and systems.

### ***Budget***

Table 7-1 lists the proposed budget for the three study area activities described above. Note that there is no budget allocated to third study area activity – full-scale implementation of the macro consumption approach. This is primarily because the decision to fund a full-scale implementation of a "top-down" evaluation framework is contingent on the results of the pilot studies. Additionally, it is anticipated that the costs associated with the modeling and analysis platforms of a full-scale "top-down" evaluation framework will be nominal compared to the costs associated with the data collection and analysis that will be required to feed those models. Moreover, it is likely that any primary data required as inputs for "top-down" evaluation overlap

significantly with the market and baseline data that will be collected under other 2010-2012 EM&V activity areas. However, in order to maximize such overlap (and reduce the total incremental cost of the data collection requirements for any full-scale, "top-down" evaluation approaches), it will be necessary for Energy Division and the research teams engaged in the white paper and pilot study phases of this project to stay actively informed of the baseline and market data collection activities that will be conducted under other activity areas in order to influence, where appropriate, specific data collection activities that can be leveraged for "top-down" evaluation applications.

**Table 7-1: Macro Consumption Studies – Budget**

| Study | Budget | Primary Lead |
|---|---|---|
| Macro Consumption White Papers | $150,000 | ED |
| Macro Consumption Pilot Studies | $500,000 | ED |
| Full-Scale Implementation | n/a | ED |

***Timeline***

Table 7-2 lists the proposed timelines for the macro consumption studies described above.

**Table 7-2: Macro Consumption Studies – Proposed Timeline**

| | 2011 | | | | 2012 | | | |
|---|---|---|---|---|---|---|---|---|
| **Study** | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 |
| Macro Consumption White Papers | X | X | X | | | | | |
| Macro Consumption Pilot Studies | | | X | X | X | X | | |
| Full-Scale Implementation | | | | | | | X | X |

### *7.1.2 Residential Saturation Surveys*

***Summary of EM&V Activity/Study Area***

This study area focuses on residential saturation surveys. There are two key study types in this area:

- A residential appliance saturation study (RASS) that is primarily a mail survey that involves a sample of over 20,000 homes. This study asks basic questions about dwelling structure and appliance holdings and usage. In addition to appliance saturation estimates, a statistical analysis is performed to develop end use consumption estimates. The 2009 California RASS was completed in mid-2010.

- A residential on-site saturation survey, an example of which is the California lighting and appliance saturation study (CLASS) that is a detailed on-site survey that includes approximately 1,000 homes. This type of study utilizes trained surveyors to collect detailed information about the dwelling structure and key equipment and appliances. In addition, make and model number of key equipment are collected and analyzed to provide estimates of equipment efficiency. A detailed lighting inventory was also collected in the most recent CLASS study, which was completed in 2005.
- Either of these two types of studies may include sub-study elements to developed more detailed and accurate data and information, for example, through monitoring and sub-metering.

The primary differences between these two types of studies is that the RASS is more representative (having a much larger sample size), while the CLASS is more detailed and accurate (being performed by trained surveyors).

***Need and Application of Results***

The residential saturation surveys serve a number of needs in the forecasting and program planning areas. For forecasting, appliance saturation and usage estimates are key inputs into the CEC's end use forecasting model. In the program planning area, the surveys provide data that serve a number of needs, including:

- Saturations and usage of energy efficiency equipment and dwelling structures that are used to estimate energy efficiency potential.
- Saturations of older, less-efficient appliances that can be targeted by appliance recycling programs.
- Characterization of manufactured housing and fraction meeting Energy Star requirements (if an oversample is utilized).
- Data to support a feasibility analysis of deep energy reductions in homes (e.g., including leakage estimates if blower-door tests are utilized).
- Ages of key appliances to assist program planning.
- Characterization of new homes to help assess baselines for new construction programs.

***General Approach, Issues, and List of Studies and Activities***

Since a RASS was just completed in 2010, the activities around this study are limited to mining the current data that was collected and to start planning for the next RASS. Data mining activities would include:

- Estimation of end use saturations and equipment usage for sub-segments of the sample.

- Providing characterizations for sub-segments of the sample (such as large users).
- Cross tabulating results of selected survey questions in response to focused analysis questions.
- Providing weights to aggregate DEER results.

RASS-related activities could include: further mining and analysis of current and historic RASS data, identifying the appropriate time period between RASS studies; holding workshops to identify key issues that could be addressed in the next RASS; developing methodologies to improve the RASS analysis (such as incorporation of AMI data into the next RASS consumption analysis); and identifying appropriate budgets that will be necessary to address all the issues that are typical to a RASS.

The key issue for a residential on-site survey involves scope. The previous CLASS targeted about 1,000 homes and collected information on dwelling structure, major appliances, and included a comprehensive lighting inventory. In addition to the IOUs, SMUD was also included in the study and contributed to study funding. While all home types were addressed, sample sizes for some market segments were fairly small. The following activities should be considered:

- Oversampling of manufactured homes.
- Oversampling of new construction homes.
- Removing the lighting inventory component of the study since a comprehensive lighting inventory was developed in the 06-08 evaluations.
- Adding a consumer electronics / plug load inventory.
- Adding blower-door and duct leakage testing to the study, possibly for a subsample.
- Adding a metering component to the study for a subsample of homes, such as one or more of the following:
  - Air conditioners
  - Refrigerators
  - Plug loads – mainly home office or entertainment equipment
  - Multi-end-use metering to assess consumption for a large number of end uses utilizing WiFi technology
- Inviting key municipal utilities to join the study (SMUD, LADWP).

***Studies and Activities***

| Study Name | Sector(s)/Segments/ Programs/Measures | Objectives | Summary Description | Key Activities | Priority | Primary/ Secondary Lead (ED - IOU) |
|---|---|---|---|---|---|---|
| RASS | Residential | Develop additional estimates from the current RASS to assist in program planning an evaluation | On an as-needed basis, conduct specific analyses, utilizing the RASS dataset, to answer questions about residential dwellings and appliance holdings | Ad hoc analysis of RASS data as requireed | High | ED |
| | | Develop plan for the next RASS to ensure rapid deployment in next cycle | Plan to that addresses multiple needs and provides appropriate methods and budget for the next RASS | Workshops; methodology development; budgeting | Med | ED |
| CLASS | Residential | Develop comprehensive data on residential homes and their equipment | Conduct on-site surveys and subsequent analysis to characterize the structure and equipment/appliances in a representative sample of CA homes. | Research plan (survey and sample design); on-site survey implementation; analysis that includes efficiency look-ups; reporting that includes a standard report and an Internet data reporting tool | High | ED |

***Budget***

RASS – budget will depend on the scope of the work and whether planning for the next study is included:

- Low: $100,000
- High: $300,000

Residential On-Site Survey – budget will depend on study scope. The following table provides preliminary estimates:

| | Sample Size | | | | |
|---|---|---|---|---|---|
| | 1000 | 1250 | 1500 | Base | Per Site |
| Base (similar to 2005) | $1,050,000 | $1,200,000 | $1,350,000 | $450,000 | $600 |
| Base plus electronics | $1,265,000 | $1,440,000 | $1,615,000 | $565,000 | $700 |
| Base minus lighting | $930,000 | $1,062,500 | $1,195,000 | $400,000 | $530 |
| Base plus electronics minus lighting | $1,145,000 | $1,302,500 | $1,460,000 | $515,000 | $630 |

Metering Increment

| Sample size | 100 | 200 | Base | Per Site |
|---|---|---|---|---|
| AC-only | $116,000 | $192,000 | $40,000 | $760 |
| Electronics-only | $126,000 | $172,000 | $80,000 | $460 |
| Refrigerator-only | $83,500 | $127,000 | $40,000 | $435 |
| AC-Electronics | $226,000 | $332,000 | $120,000 | $1,060 |
| AC-Refrigerator | $183,500 | $287,000 | $80,000 | $1,035 |
| Electronis-Refrigerator | $233,500 | $307,000 | $160,000 | $735 |
| AC-Elec-Refrig | $293,500 | $427,000 | $160,000 | $1,335 |
| Multi-end uses | $391,000 | $607,000 | $175,000 | $2,160 |

Leakage Increment

| Sample size | 100 | 200 | Base | Per Site |
|---|---|---|---|---|
| Blower Door/Duct Blaster | $60,000 | $80,000 | $40,000 | $200 |

| | |
|---|---|
| Low | $930,000 |
| High | $2,147,000 |

***Schedule***

**Table 7-3: RASS – Proposed Timeline**

| | 2011 | | | | 2012 | | | |
|---|---|---|---|---|---|---|---|---|
| **Activity** | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 |
| Mining current RASS data | X | X | X | X | X | X | X | X |
| Planning for the next RASS | | | | | X | X | X | X |

**Table 7-4: Residential On-Site Survey – Proposed Timeline**

| | 2011 | | | | 2012 | | | |
|---|---|---|---|---|---|---|---|---|
| **Activity** | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 |
| Project Initiation | X | | | | | | | |
| Research Plan | X | X | | | | | | |
| Data Collection | | X | X | X | | | | |
| Analysis | | | | X | X | X | | |
| Reporting | | | | | | X | X | |

### *7.1.3 Commercial Saturation Survey*

***Summary of EM&V Activity/Study Area***

A commercial saturation and energy consumption study, often referred to as a Commercial End-Use Survey (CEUS), will be a study within the Energy Consumption, Saturation, and Market Share (Level 3) sub-group of Market Analysis (Level 2). The key characteristics of this study are that it utilizes detailed on-site surveys for data collection, has sample sizes large enough to produce statistically significant results for major building types, and integrates building site characteristic data with energy consumption and load shape metering data provided by utilities. The study provides baseline and longitudinal data for numerous planning, evaluation, and policy purposes.

The most recent CA CEUS (2006)[2] and recent IOU CEUS (PG&E 1998, SDG&E 1998) were comprehensive on-site studies that gathered information about building square footage and building shell characteristics, occupancy and operational hours, building facilities, energy-related systems and equipment, and energy efficiency measure saturations. The comprehensive on-site data collection is combined with energy consumption data provided by the utilities to determine whole building energy and peak demand intensities (e.g., kWh, kW, and therms per square foot of floor space) and estimate end use energy use and peak demand intensities (EUIs). For the CA CEUS study, this data was also used to produce a database of calibrated, building simulation models that can be dynamically manipulated to produce a variety of segment-level results, as well as perform energy efficiency measure analysis. The majority of the field data for the last CA CEUS was collected in 2003 and 2004.

The commercial saturation study for the current EM&V cycle will provide important updates to key commercial sector data needed to support CPUC policy, CEC forecasting requirements, and IOU program and portfolio planning.

***Need and Application of Results***

CEUS studies have been conducted by California utilities and energy agencies since the 1980s. California is relatively unique in the country in having required and conducted commercial end use, saturation, and consumption surveys over several decades. CEUS studies have been the basis for responding to legislated requirements under the Warren-Alquist Act to support the state's energy forecasting conducted by the California Energy Commission (CEC). In addition, CEUS studies have been the only statistically representative source of the critical data needed for a wide variety of planning and evaluation applications.[3] The need for a commercial saturation

[2] The California CEUS covered the service areas of the four IOUs and SMUD.

[3] Most other jurisdictions have not conducted this type of fundamental baseline research and, consequently, end up relying on and often citing California's CEUS studies along with the Department of Energy (DOE), Energy Information Agency's (EIA) Commercial Building Energy Consumption Survey (CBECS).

study was called out in the CPUC's 2010-2012 EM&V decision and included as an element of the associated, initial Joint ED IOU EM&V plan. The extensive and varied data developed from a CEUS study has a multitude of uses including providing important information for utility program planning, ex ante development and the Database for Energy Efficiency Resources (DEER), potential energy efficiency forecasts and goal setting, benchmarking tool development, and demand forecasting.

The following is a partial list of how data from the current CEUS have been used and how the future CEUS data could be used. Updating these applications will ensure that program planners, building owners, consultants, and the CPUC and CEC are using the most reliable data available.

*Primary Data Collected and Example Uses from 2006 CEUS*

- **Building Type Characterizations:** The CEUS data contains detailed building type descriptions, more detailed than just building segment. This detail helps the CEC, CPUC, and IOUs characterize sub-segments for program planning and analysis efforts.
  - The sub-segment data yields useful insights for program planning. These data are especially useful for examining (and targeting) the "Miscellaneous" segment, one of the largest commercial segments.
  - The CEUS data can be used to examine the issues of misclassification of customers that is inherent in the use of NAICS and SIC codes, which are assigned at a corporate level, not based on the actual activity that occurs at a site.
  - The CEUS data can also be used to examine the "cross-over" issue, that is, mischaracterization in the IOU billing data of a site as "commercial" when it is really industrial, multifamily, or some other non-commercial sector.
- **Equipment Saturations**: Saturations have been calculated for a variety of end uses and equipment including HVAC, lighting, water heating, refrigeration, office/computer, etc.
  - Equipment saturations have been used for program planning, codes and standards, ARB (greenhouse gas and refrigerant), CEUS PIER efforts, as well as potential studies, and to improve DEER prototypes.
  - Some of the eQUEST building simulation models from the CA CEUS (2006) study are being used to perform a more realistic assessment of daylighting potential, based on actual rather than prototype buildings (by the Heshone Mahone Group for the CEC).
  - Equipment saturations are used in the CEC load forecasting model. The CEUS estimates are used to update the end use EUIs and equipment share values in the CEC model.
  - Changes in equipment saturations overtime help program planners and policy makers to determine the effectiveness of programs and to determine the measures, end-uses,

building types, and climate zones with significant remaining potential. A statewide CEUS makes trending/tracking easier, as it ensures that the survey is conducted consistently across the state, with the 2006 CA CEUS used as a consistent starting point.

- Equipment saturation data will provide program planners, potential forecasters, and the CPUC and CEC with extensive information on the current commercial baseline.

- **Equipment Efficiencies**: Efficiency data is collected for most end uses including lighting, HVAC, and refrigeration.
  - Efficiency data have been used to help determine the remaining energy efficiency potential, which also supports development of efficiency goals.
  - Efficiency data are used to understand current commercial baselines and to focus future program planning.
  - Efficiency data can be used to help inform market transformation goals and progress. For example, lighting data from the 2006 CEUS will be used in a DOE/Navigant study of Lighting Market Transformation. Highly varying efficiency lighting market shares from previous CEUS studies were used to identify significant levels of market transformation among larger commercial facilities and significant remaining potential within smaller, hard-to-reach customers.
- **End-Use Energy Intensities (EI)**: The whole building and end-use energy intensities calculated from the CEUS data are used to determine baseline energy usage and to help calculate measure savings.
  - Energy intensities and measure savings calculated from the CEUS data are used in energy efficiency potential studies, long-term efficiency scenario analyses (for CEC PIER climate change research) and in benchmarking tools.
  - Whole building and end use energy intensities are used in the CEC load forecasting model. The CEUS estimates are used to update the values in the CEC model.
  - The saturation and energy intensity data were used to assess and update the CBECS survey and modeling approaches (DOE/KEMA).
  - Energy intensities could be used to help develop top-down consumption metrics and to help establish consumption based goals.
  - Energy intensities could be used to develop a baseline on the share of existing buildings that currently exceed Title 24 standards.
- **Integration of Energy Efficiency and Direct Generation:** The CEUS collects information on commercial on-site distributed generation measures. This information and data on the site's participation in energy efficiency and demand response programs will help provided a baseline for the current level of integrated demand side management.
  - The phone recruitment survey for the on-site data collection activities can be used to collect information on the sites awareness, knowledge, acceptance, and behavior as it

relates to energy efficiency, demand response, distributed generation, water conservation, and the reduction of greenhouse gases.

*Additional Examples of CEUS Data Applications*

- **Benchmarking**: The IOU CEUS projects were used to help develop the LBNL CalARCH benchmarking tool. The CA CEUS (2006) is had been used to develop a new LBNL benchmarking tool, EnergyIQ.
  - The growing importance of benchmarking in energy efficiency programs supports the continuation of CEUS studies to update, refine, and improve benchmarking tools to continue to represent the current understanding of commercial building energy usage in California.
  - Assembly Bill 1103 (AB 1103) as of January 1, 2010 requires the benchmarking of non-residential buildings for some commercial real estate transactions. The IOUs already require benchmarking for any commercial customer that participates in any of their programs.
- **CEUS on the Web**: Detailed summary results and load shapes (16 day, Monthly, 8760 shapes, etc.) for the 2006 CA CEUS are available online (http://capabilities.itron.com/CeusWeb/Default.aspx). This effort was funded by the IOUs, and initiated by SDG&E (Approximately 13,000 hits).

***General Approach, Issues, Studies/Activities***

The commercial saturation survey will be undertaken as a comprehensive on-site survey combined with utility provided consumption and interval metered data. The survey will gather information on building and business type, building size, dimensions, and shell composition, occupancy and operating hours for the facility and by end use, and saturations and efficiencies of systems and equipment. The on-site survey data can be matched with premise level energy usage information to enable the calculation of end use energy intensities. When available, hourly energy usage information could be used to help calibrate the simulation models, leading to more accurate estimates of load shapes and energy intensities. Due to the variety of commercial business types and complexity of commercial energy-related characteristics, there is a wide range of potential scope elements associated with any commercial on-site survey study; each of which has advantages and disadvantages associated with value, cost, and schedule

*Implementation Options*

The primary issues surrounding the commercial saturation and end use estimation studies are its timeliness, cost, and focus. The 2006 CEUS, while being the first study of its kind to fully integrate building simulation concepts with a very large, representative sample of on-site

surveys, required over four years to complete and a large budget.[4] The approach for the next commercial saturation study must learn from the past, putting forth an approach that requires less time and efficient application of resources, while focusing on and ensuring high quality results. The study emphasis, data results, and budget options for a commercial saturation survey have an extensive range of options, of which three are presented here.

**Option 1: Commercial Building Equipment Saturation Study (CBESS).** This most basic approach would be solely an on-site inventory of commercial building equipment (quantity, type, size, age, efficiency, etc.) and key business type and building characteristics. End use energy estimates and load shapes would not be produced in this option, so neither building simulations nor any other modeling would be conducted. The only energy intensity that would be determined for this option is the whole building intensity (from total annual energy use and the total floor area for the site). This option would produce equipment saturation data and whole-building EUIs for a large sample of buildings, representative at the building type level, for less cost and time than the other options. The cost and time savings come through the elimination of the building simulation element of the scope, which also elements end-use EUIs and load shapes from the project deliverables.

**Option 2: CBESS w/Nested End Use Estimation Sub-Sample.** This approach would be a combination of a CBESS large sample, on-site inventory of building equipment and business type and building characteristics combined with a sub-sample that includes calibrated simulation models to produce end use EUIs and load shapes. Equipment saturation data and whole-building EUIs would be produced for a large sample of buildings, representative at the building type level. End use energy estimates and load shapes would be produced only for a representative, nested sub-sample. The end use estimation work for the nested sub-sample would be conducted with the objective of supporting refinement of the building prototypes used for DEER and related ex ante savings estimation tools. This option would explore the feasibility of extrapolating end use consumption estimates to the larger sample and calibrating at the building type rather than the individual building level.

**Option 2b: CBESS with Nested Sub-Sample for DEER Enhancement, not EUIs.** The primary difference from this and the previous approach is that calibrated building simulation models would be used solely to refine the building prototypes used for DEER and related ex ante savings estimation tools, rather than to produce end use EUIs and load shapes for all sites. The building simulations under this option would be research-grade calibrated simulations, and would likely need to use eQUEST directly rather than through the DrCEUS wizard approach. Limited end-use monitoring for the nested sub-sample could also be considered under this option. As DrCEUS would likely not be used for the building simulations, a new, more manual and custom simulation and calibration process would be required.

[4] The 2006 CEUS budget was approximately $5M and contractors spent $7M.

**Option 3: CBESS Plus Full Sample End Use Estimation.** This approach would follow a very similar process as the 2006 CA CEUS. The full gamut of data required to do a detailed building simulation model would be collected, and the model calibrated to all available utility consumption data, as well as interval metered data. The on-site survey from would be updated and modified to include new measures and focus issues. The DrCEUS software and system would also be updated. This option would yield end-use energy intensities, end-use load shapes, as well as detailed inventories of equipment for the entire sample. The end-use results including load shapes would be made available through a web site as are the current CA CEUS results. In addition, unlike the previous CEUS, the report should also include comprehensive equipment saturation results and, in addition, another option would be to create a tool that can be used to create those reports interactively (similar to the current CLASS tool).

*Discussion*

Given the need to provide high quality data for the many applications cited, and to contain the budget and time to complete the study, the project is likely to pursue either the CBESS or CBESS with End Use Estimation Sub-Sample or DEER Enhancement approach. Either of these approaches will provide many of the benefits of the 2006 CEUS while being more timely and cost effective.

The benefit of the CBESS approach is its cost savings, while providing extensive information on measure and system saturations and whole building EUIs. A disadvantage of using the CBESS approach is the inability to estimate end use EUIs that are important for potential forecasting, load forecasting, program planning, and within benchmarking tools. In contrast, the benefits of the CBESS plus Nested End Use Sub-Sample approach is the ability to provide extensive information on measure and system saturations, whole building EUIs, and end use EUIs. The drawback of the latter approach is the longer time to completion, the additional financial costs, and smaller sample of sites used for end use estimation. However, the goal of the end use sub-sample will be to develop a commercial building end use estimation tool that is designed to improve the DEER prototypes to create more population diversity.

With either approach, the team will have to evaluate the tradeoffs that must be undertaken to reduce costs while ensuring data integrity. Likely areas where resources can be reduced from the CA CEUS include reductions in software costs associated with the continued use of DrCEUS with only minor modifications[5], lower on-site survey development costs, and lower costs associated with premise usage development. The lower survey development costs will result from the team's familiarity with the latest CEUS survey and by the reduction in the number of sites for which building simulation and end use estimation will be conducted. It will also be

[5] The CBESS only approach does not use building simulation models, so DrCEUS would not be needed for this option.

important to focus the research planning and pre-testing of data collection and analysis options on tradeoffs between sample size and data quality and comprehensiveness.

***Budget***

Table 7-5 lists preliminary budget numbers associated with the three options described above.

**Table 7-5: Commercial Saturation Survey – Budget Options**

| Option Description | # of Sites | Total Cost |
|---|---|---|
| ***CBESS***: On-site Saturation Survey with Whole Building EUIs | 2,000 | $3,000,000 |
| ***CBESS Plus Nested Sub-Sample***: On-site Saturation Survey with Whole Building and End Use Simulation EUIs for a Nested Sub-Sample | 2,000 (EU Sim of subset of 500) | $5,000,000 |
| ***CBESS Plus Nested Sub-Sample***: On-site Saturation Survey with smaller simulation-calibration sub-sample but addition of sub-metering sample | 2,000 (EU Sim and metering of subset of 250) | $5,000,000 |
| ***CBESS Plus Full Sample End Use EUIs***: On-site Saturation Survey with Whole Building and End Use EUIs | 2,000 | $8,000,000 |

***Schedule***

Given the extended time requirements of a commercial saturation study, efforts should be made to begin the study in the first half of 2011. If the basic option is chosen, the end use simulations task will not be necessary, the survey task would be likely to take less time as would analysis and documentation. If the basic option is chosen, the study timeline could be moved up, completing the study in Q1 of 2013. The research should begin with piloting of alternative data collection approaches to better assess the optimal value point between resources expended per site to maximize data quality versus sample size to maximize representativeness and statistical precision.

**Table 7-6: Commercial Saturation Survey – Proposed Timeline**

| Activity | 2011 | | | | 2012 | | | | 2013 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 |
| Process Commercial CIS and Develop Sample | X | X | | | | | | | | | | |
| Phone Survey Development | X | X | | | | | | | | | | |
| Phone Surveys and Recruitment | | | X | X | X | | | | | | | |
| On-Site Survey Refinement & Modifications | X | X | X | | | | | | | | | |
| Training and Testing of On-Site Survey Form | | X | | | | | | | | | | |
| On-Site Data Collection | | | X | X | X | X | | | | | | |
| Data Cleaning | | | X | X | X | X | X | | | | | |
| Develop Saturation Results | | | | | | | X | X | | | | |
| DrCEUS Modifications | | | X | …On-going… | | | | | X | | | |
| End Use Simulations | | | | | X | X | X | X | X | | | |
| End Use Metering/Monitoring | | | X | X | X | X | X | | | | | |
| Integrated Analysis and Report/Documentation | | | | | | | | X | X | X | * | * |

* Final report date will depend on the option chosen.

### *7.1.4 Industrial Saturation Surveys*

***Summary of EM&V Activity/Study Area***

This study area focuses on industrial saturation surveys and related activities. There are two primary study types considered in this area: industrial on-site surveys and industrial characterization studies.

In 2005, the California IOUs began planning for an industrial end use saturation survey (IEUS). A sample design and draft survey instruments were developed. In order to meet Title 20 precision targets, the IEUS required a sample that would include a near-census of the 400 or so largest industrial customers in California. During the pretest stage of this study, it became apparent that industrial customers were not interested in being surveyed, an event that could take from 4 to 8 hours at their facilities. In this light, the IEUS study team began investigating other approaches for developing industrial data to be used for forecasting and program planning.

***Need and Application of Results***

The industrial studies serve a number of needs in the forecasting and program planning areas. For forecasting, end use shares and an understanding of efficiency levels are inputs into the CEC's end use forecasting model. Industrial load shapes are another element that the CEC is also interested in. In the program planning area, the studies provide data that serve a number of needs, including:

- Saturations of energy efficiency equipment that are used to estimate energy efficiency potential
- Characterization of the industrial sector in terms of energy efficiency to help program planners identify key market segments and end uses to target programs to
- Understanding gaps between energy efficiency potential and recent program activity

***General Approach, Issues, and List of Studies and Activities***

The IEUS team has discussed a number of approaches to collecting information on the industrial sector. These approaches have included:

1. Further mining of the 2006 MECS (US DOE's Manufacturing Energy Consumption Survey)

2. Analysis of industrial billing data and AMI data to develop usage profiles and load shapes

3. Secondary source research to characterize energy using equipment and energy efficiency opportunities in the industrial sector

4. Analysis of program tracking data to understand where savings are coming from and where gaps between potentials and program efforts exist

5. Vendor surveys to understand baselines and key new technologies

6. Telephone surveys to confirm MECS end uses, assess energy efficiency potential and customer awareness, and validate NAICS

7. Simplified on-site surveys to confirm MECS end use shares and generally assess energy efficiency potential, validate NAICS

8. Integration of on-site surveys with detailed audits

Items 1-5 on the list do not involve industrial customer contact and can be grouped together as an industrial energy use characterization study. The final 3 items on the list involve various aspects of industrial customer surveys.

Given the difficulties in recruiting industrial customers for surveys, we believe the characterization study should be a higher priority to provide planning information on the industrial sector. It may also be possible to bundle brief customer telephone surveys (which are less costly and less burdensome on the customer) in with a characterization study.

Industrial on-site surveys should probably be given a lower priority, given the large hurdles that must be overcome to get access to customer facilities. If on-site surveys are still warranted, we believe the largest industrial customers should be targeted as they account for, by far, the largest share of industrial energy usage. Discussion to date has focused on a sample of 200 customers, spread across industry segments. The best options include simplified industrial surveys (averaging about 2 hours per site) as a lower-cost option, and in depth surveys (averaging about 1 day per site) integrated with comprehensive facility audits as a higher-cost option. We think the audits would provide the customer incentive required to gain extended access to facilities for required field work.

## ***Studies and Activities***

| Study Name | Sector(s)/Segments/ Programs/Measures | Objectives | Summary Description | Key Activities | Priority | Primary/ Secondary Lead (ED - IOU) |
|---|---|---|---|---|---|---|
| Characterization Study | Industrial | Characterize energy use and energy efficiency in the CA industrial sector | Develop and present data on the CA industrial sector, including end use consumption estimates, load shapes, key end uses and measure to target for energy efficiency, and a gap analysis between potential and recent program accomplishments | Project plan; data collection (including tracking/billing/AMI data request to the IOUs); analysis of data; reporting | Med | ED |
| Phone Surveys | Industrial | Collect information about presence of end uses, general efficiency levels, and customer awareness; validate NAICS coding | Conduct telephone surveys of approximately 600 industrial customers to gain insights about industrial customers with minimal intrusion | Research plan (survey and sample design); telephone survey implementation; analysis and weighting of survey results; reporting | Med | ED |
| Simplified Onsite Surveys | Industrial | Collect information about to confirm or adjust MECS end use shares, assess energy efficiency potential, and validate NAICS codes | Conduct on-site surveys of 200 largest customers and subsequent analysis better assess end use energy consumption and energy efficiency potential; short, minimally invasive, on-sites may be acceptable to customers | Research plan (survey and sample design); on-site survey implementation; analysis of survey data; reporting | Med | ED |
| Surveys and Audits of Large Customers | Industrial | Develop comprehensive data on industrial facilities, including end use shares, energy efficiency potential, and NAICS code validation | Conduct on-site surveys of 200 largest customers and subsequent analysis to characterize energy use and energy efficiency at industrial facilities and provide custom audits to customers as an incentive to participate. | Research plan (survey and sample design); on-site survey implementation; development of site-specific audit reports; analysis of survey data; reporting | Med | ED |

## ***Budget***

Characterization Study – budget will depend on the scope of the work:

- Low cost: a base analysis of billing data, estimation of end use consumption using MECS, an analysis of recent program tracking data to understand who participates and which measures are taken, and secondary research on key industrial measures by end use

  $150,000

- Mid cost: the same effort as low, plus analysis of AMI data to develop load shapes and peak demand estimates

  $225,000

- High: the same effort as mid, plus more extensive measure research, a consumption trend analysis, and estimates of end use peak consumption

  $300,000

Surveys:

- Telephone survey: $280,000
- Simplified on-site survey: $450,000
- Surveys-Audits of Large Customers: $2,400,000

***Schedule***

**Table 7-7: Industrial Characterization Study – Proposed Timeline**

| Activity | 2011 | | | | 2012 | | | |
|---|---|---|---|---|---|---|---|---|
| | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 |
| Initiation and Planning | X | X | | | | | | |
| Data collection | | X | X | X | | | | |
| Analysis | | | | X | X | X | | |
| Reporting | | | | | | X | X | X |

**Table 7-8: Industrial Saturation Survey – Proposed Timeline**

| Task | Phone Survey | Simplified On-site Survey | On-site Survey-Audits |
|---|---|---|---|
| Initiation and Planning | Q1 2011 | Q1 2011 – Q2 2011 | Q1 2011 – Q2 2011 |
| Data Collection | Q2 2011 – Q3 2011 | Q3 2011 – Q4 2011 | Q3 2011 – Q2 2012 |
| Audit Reports | | | Q3 2011 – Q3 2012 |
| Data Analysis | Q3 2011 – Q4 2011 | Q4 2011 – Q1 2012 | Q3 2012 – Q4 2012 |
| Reporting | Q4 2011 – Q1 2012 | Q1 2012 – Q2 2012 | Q1 2013 |

### *7.1.5 Residential Market Share Tracking*

***Summary of EM&V Activity/Study Area***

The Residential Market Share Tracking project (RMST) is a proposed study within the Energy Consumption, Saturation, and Market Share (Level 3) sub-group of Market Analysis (Level 2). The RMST study has historically tracked the sales of high efficiency measures (CFLs, HVAC, Appliances (dishwashers, clothes washers, refrigerators, and room air conditioners)) over time reported yearly or quarterly (where available). The data used come from a variety of sources including retailer point of sales (POS) data purchased from vendors (Lighting), individual retail sales data gathered from a sample of store fronts (Appliances), and distributor sales data (HVAC).

The RMST supports California's investor-owned utilities (IOUs) in their program planning and efforts to measure statewide and IOU-specific program milestones for promoting short-term adoption of measures and longer-term market acceptance of energy efficient technologies. The RMST results have also been used in Potential Studies, market effects studies, and as an indicator of market transformation. In addition to the California IOUs, beneficiaries of this research includes federal and state agencies, regional and state energy efficiency organizations, trade organizations, and equipment manufacturers, distributors, and retailers.

The RMST project had monitored the market penetration of energy efficient measures in California since 1999 until it temporarily stalled in 2008. The Lighting sub-project of the RMST tracked the sales of lighting equipment (including all types of CFLs, halogens, and incandescent) for nine years. The data used for RMST contain the level of detail needed to offer a comprehensive look at the market for lamps. Specifically, point-of-sale (POS) data representing four major retail channels through which lamps are sold (food, drug, mass merchandiser, and hardware stores) contain line-item detail[6] on monthly lamp sales for both California[7] and the U.S. These data are analyzed and aggregated to estimate overall lamp sales in the residential lighting market and to characterize lamp sales and price trends over time, by lamp types, in different geographic regions, and through various retail channels. Including a national comparison area provides a context in which to evaluate the success of California's energy efficiency programs at increasing the sales and reducing the relative prices of energy efficient lighting.

[6] Each line item contains detailed information such as the manufacturer, UPC, watts, package size, price, and quantity sold.

[7] The California data are further subdivided into the California electric IOU service territories: Pacific Gas & Electric Company (PG&E), Southern California Edison (SCE), and San Diego Gas & Electric Company (SDG&E).

The Appliance sub-project of the RMST also tracked sales from 1999-2007.[8] The most recent RMST Appliance report has two primary elements. First, national appliance retail chains provide sales data to the contractor of the national ENERGY STAR® program. This contractor, D&R International, shares these RMST data. Second, independent appliance retailers throughout California were recruited and provide detailed sales data.

The HVAC sub-project of the RMST was discontinued in 2008 due to a decrease in the number of distributors providing sales data. Several of the distributors who had supplied data for the project, have been purchased by manufacturers who do not allow their sales data to be shared. The HVAC portion of this study, however, is an important aspect the RMST study and while we do not propose continuing the analysis under the former methodology we recommend an alternative approach for capturing the information.[9]

***Need and Application of Results***

The systematic collection of the market share tracking data to enable the monitoring of residential energy efficient market shares is a key element needed to determine the progress towards market transformation goals. Changes in market shares over time are the ultimate indicators of whether a given program, or collection of programs, are successfully accomplishing the market transformation goals. These goals necessitate the dedication to consistently collecting these data. The current lack of an extensive market share tracking database, made it difficult to determine the State's progress toward the residential lighting market transformation goals during the 2006-2008 Residential Lighting Market Effects Study. The 2006-2008 Study was relegated to using cross state analyses to determine market efforts due to the lack of extensive time series data on lighting market shares for all channels. The increasing importance of market transformation in the Strategic Plan necessitates the development of comprehensive multi-year market share tracking databases.

***General Approach, Issues, Studies/Activities***

*Discussion of Types of Data Used in Market Share Tracking Projects*

In addition to deciding which measures to track, other key decisions that need to be made when considering starting a Market Share Tracking Study are which data to collect and how often to collect it. The following discussion attempts to briefly discuss these items before presenting the options and costs envisioned for the Residential Market Share Tracking Study for 2010-2012.

8 *California Residential Efficiency Market Share Tracking – Appliances 2007.*

9 *California Residential Efficiency Market Share Tracking – HVAC 2005.*

**Types of Data**

Many types of data can be used to help estimate the market share of high efficiency measures over time. Measures that get installed in residential applications are typically purchased at retail stores, through contractors, or directly from a distributor/manufacturer (typically in the case of new construction and/or major remodel). As such, the best way to track market shares can change by the type of measure being tracked.

- **Lighting:** Most lighting measures installed in residential applications are purchased through retail stores. Therefore, the ideal method for tracking market shares of basic, advanced and super CFLs, as well as LEDs, would be to gather detailed point-of-sales data for every store where lighting is sold in California.
- **Appliances:** Most major appliances installed in residential applications are purchased through retail stores or installed directly by a new home builder. Therefore, the ideal method for tracking market shares of HE appliances (clothes washers, dishwashers, refrigerators and room air conditioners) would be to gather detailed point-of-sales data for every store where appliances are sold in California and obtain installation data for every new appliance installed in a new home by a builder.
- **HVAC and Water Heating:** Most HVAC and DHW equipment installed in residential applications are purchased through a contractor or installed directly by a new home builder. Therefore, the ideal method for tracking market shares of HE HVAC and DHW equipment would be to gather detailed sales data from every HVAC contractor and plumber working in California and obtain CF-6R forms[10] for every new home in California.
- **Plug loads:** Other key household items that use electricity (including: computers, TVs, printers, game consoles, DVRs, DVD players, etc.) are purchased through retail stores. Therefore, the ideal method for tracking market shares of these measures would be to gather detailed point-of-sales data for every store that sells these measures in California.

Due to logistics, not to mention time and cost, none of these ideal methods are possible, however, they are an important place to start the discussion about where and how to get data that can proxy for the "ideal" data. Various options include:

- **Gather detailed sales data** for a subset of the population of retailers, contractors, distributors, etc.
  - Advantages:

[10] CF-6R forms are installation forms required for all HVAC and DHW equipment installed in new homes or during major remodels. These forms are filled out by the contractor or builder and submitted to the local building department.

- Detailed sales data include all of the information needed to determine the efficiency of the equipment (as opposed to only an estimate of % above or below some level (or % EnergyStar)).
- Detailed sales data include the total quantities sold – eliminating the need to determine the correct weighting for these data.
- Detailed sales data include the dates sold (typically total sales by month or quarter).
- Detailed sales data might include pricing data which would provide additional input to the cost studies.

— Disadvantages:

- Difficult to find market actors willing to provide what they consider confidential data. Even if confidentiality agreements are signed, many are still unwilling.
- Data comes in a different format from every market actor. This can be time consuming and costly to merge the datasets for analysis.
- Costly and time consuming to cultivate relationships with the market actors providing data to continue providing it over time.

■ **Conduct market actor phone surveys** to obtain self reported, aggregated, estimates of sales for a subset of the population of retailers, contractors, distributors, etc. (This is best if followed up by either an email or paper survey so that the respondent can record information at their leisure instead of while feeling rushed on the phone.)

— Advantages:

- Market actors are more willing to provide aggregated estimate of sales (without prices).
- Lower cost than attempting to collect detailed sales data.

— Disadvantages:

- Even though market actors are more willing to provide this level of data, it is still difficult to obtain. Some market actors will estimate the percentage of sales in various efficiency buckets or % EnergyStar, but will not provide total quantity sales. Even if confidentiality agreements are signed, many market actors will not participate.
- Every market actor is likely to have their own data format. Processing these data can be time consuming and costly. In addition, market actors will provide data at different levels of aggregation which can make it difficult to merge across market actors.
- Cultivating relationships with these market actors can be difficult and will need to be renewed with each round of the study. Direct contact with the market

actor is likely to be limited to a short telephone call, followed by the market actor being asked to develop a matrix of estimates. The short telephone encounter may not be memorable enough for them to remember what/how they provided the data the next year when it is requested again.

- **Conduct phone surveys of residences** to find new equipment purchasers followed by **on-site surveys** to verify detailed information about the equipment.
  - Advantages:
    - Get detailed efficiency data. The on-site verification of efficiency will enable a full understanding of efficiency levels beyond simple Energy Star/Non-Energy Star classifications.
    - Collect information on the purchasers' awareness, knowledge, and attitude toward energy efficiency measures and IOU energy efficiency programs. These data will help program planners develop program delivery methods and material to encourage individuals who would have purchased standard efficiency measures to purchase high efficiency measures.
    - The phone survey search for purchasers will allow for the development of information on market sales.
    - The careful development of the survey sample will allow for appropriate weighting of the high and standard efficiency purchase information to develop market efficiency shares.
  - Disadvantages:
    - Phone surveys rely on the respondent correctly remembering what they purchased and when they purchased it.
    - On-site surveys are costly. Costs can be minimized somewhat by coordinating efforts with another study that is conducting similar on-site surveys.

***Timing***

Over the last decade, the California RMST project had monitored the market penetration of energy efficient measures sold in California annually from 1999 to 2007. Market share tracking studies should continue to be conducted annually if the available budget allows for this. Markets often change quickly (particularly for fast-developing consumer products like lighting and plug loads), so annual tracking is essential. Saturation Studies conducted every 3-5 years provide snap shots of what has happened in the market over a period of years, whereas market share tracking can help provide information on how fast the market got there and what kind of transactions the market is currently producing relative to what you want them to produce. Given how quickly markets change, if saturation studies alone are relied on for tracking, important timing information will be missed and IOU programs are likely to lag developments in the markets.

***Overview of Proposed Study***

As described above, during the last decade, the RMST has focused on tracking the sales of lighting, appliances, and HVAC equipment. Going forward the feasibility of also collecting data on hot water heaters and plug loads should be determined. We also propose a different approach for tracking most of these measures than was done previously. The following briefly summarizes the specific approaches to continue and improve the most recent RMST activities. Each approach is discussed in more detail below.

- **Feasibility Study:** Coordinate with other entities across the country to determine the success others have had in collecting lighting sales data from non-RMST retail channels where lighting is sold. This would include a literature review of other tracking studies and conversations with the entities that have been successful in collecting detailed sales data. The review will also look at collecting data for non-lighting sales. Specifically, determining if others have had success in working with appliance buying groups or HVAC distributors/manufacturers.[11]
- **Market Actor Surveys:** Depending on the outcome of the feasibility study, there are three possible options to consider funding: 1) attempt to collect detailed sales data from market actors, 2) attempt to collect self-reported, aggregated, information on sales, or 3) abandon market actor data collection efforts.
- **Lighting POS Data:** Continue to purchase the lighting POS data from ActivantVista and ACNeilsen for food, drug, mass merchandiser, and hardware stores. Purchasing these datasets will ensure the continuity of the longest set of time-series data of both CFL and incandescent prices and quantities available in the US.
- **Coordination with a residential on-site survey (e.g., CLASS type study, see related EM&V plan):** Similar to the proposed plan for the Commercial Market Share Tracking Study (CMST), we propose an expanded phone survey to identify new purchasers of targeted equipment.

These proposed changes in methodology are due in part to the obstacles encountered in the past and the new opportunity for increased coordination across various projects including the residential on-site study. Obstacles encountered in previous years of RMST include: decreased number of HVAC distributors providing sales data, difficulties retaining a significant number of

[11] As explained above, the California RMST collected detailed sales data from independent appliance retailers and HAVC distributors for nearly a decade with some success. Initial recruiting and maintaining relationships can be timely and costly. Also, given the changes in the HVAC industry with many distributors being purchased by manufacturers, it is likely to continue to be difficult to recruit manufactures to provide sales data. In 2000, the RMST study also spent a significant amount of time recruiting DHW distributors with no success. Determining if other more recent studies across the country have had more success will be beneficial to this study.

independent appliance retailers in the sample over time, and the inability to ever collect data from enough water heating distributors to sufficiently track sales.

*Lighting*

**Overview**

We propose an approach that combines the methodology used in the RMST Lighting Studies and coordinates with the proposed CLASS Study. The advantages and disadvantages of each approach as well as a more detailed methodology can be found in the following section.

- **Lighting Feasibility Study:** Coordinate with other entities across the country to determine the success others have had in collecting lighting sales data from non-RMST channels where lighting is sold. Depending on the type of data collected and the feasibility of collecting similar data in California, the work plan will be revised to include the additional data in the analysis. (Collecting, analyzing, and reporting the additional data is not currently included in the budget estimate.)
- **Lighting POS Data:** Continue to purchase the POS data from ActivantVista and ACNeilsen for food, drug, mass merchandiser, and hardware stores.

  The RMST Lighting Study conducted from 2000-2008 included purchasing point-of-sales data from ACNielsen and ActivantVista. These data sources, described in more detail below, provide detailed sales data that include not only quantity and price, but also location (region). The data are by UPC which allows the analyst to lookup detailed bulb information including lamp type, shape, base type, wattage, lumens, and other descriptors including whether the lamp is dimmable. This level of detail allows identification of whether the lamp is considered "advanced lighting" and also provides a unique data source for the incremental cost study for various types of CFLs and the base case (incandescents).
- **Coordinating with a residential on-site survey (e.g., CLASS type study, see related EM&V plan):** If collecting data from other channels is infeasible, additional lighting information may be gathered in coordination with the CLASS study. The on-site survey instrument for the CLASS Study already contains many of the fields required to capture the details needed to be able to merge the data with the POS data. The list of targeted equipment would need to be finalized during the Work Order Proposal phase of the study, but would likely include a subset of the following measures/end-uses: HVAC, appliances, water heaters, and other plug loads.

**Lighting Feasibility Study**

As explained above, the major short-coming of the lighting POS data is that it only covers lighting sales in four retail channels (food, drug, mass merchandiser, and hardware stores).

These data leave a large number of retail channels from which lighting sales data has not been available for in California. As part of the 2007 Lamp Report, two other data sources were reviewed: ENERGYSTAR CFL tracking system maintained by The Cadmus Group and *18Seconds.org* – produced by Yahoo! and Nielsen – various sponsors.[12]

**Proposed Task:** Conduct a literature review and talk to other experts in the industry to determine if any recent studies across the country have had success in collecting lighting sales data from non-RMST channels. Coordinate with these entities to understand how they recruited retailers to obtain data and how to best replicate the method in California. Depending on the type of data collected and the feasibility of collecting similar data in California, the work plan will be revised to include the additional data in the analysis. (Collecting, analyzing, and reporting the additional data is not currently included in the budget estimate.)

**POS Data Analysis**

As explained above, the lighting portion of the RMST project had monitored the market penetration CFLs in California since 1999 until it stalled in 2008. The data used for RMST contain the level of detail needed to offer a comprehensive look at the market for lamps. Specifically, point-of-sale (POS) data representing four major retail channels through which lamps are sold (**food, drug, mass merchandiser, and hardware stores**) contain line-item detail[13] on monthly lamp sales for both California[14] and the U.S.

**Task 1: Analyze and Report on the 2008-2009 POS Data.** Recently, the California IOUs have begun Phase 2 of the Advanced Lighting Baseline Study which includes purchasing recent lighting POS data (2008-2009). This Study also includes some budget for analysis of the data, but not the level of analysis that is required to produce a 2009 update to the 2007 Lamp Report (the most recent RMST lighting report). The first task in the 2010 RMST Study would include the analysis and reporting of the 2008-2009 data.

**Task 2: Purchase and Analyze the 2010 POS Data.** Depending on the timing of the RMST Study, this task could coincide with Task 1. The earliest that the 2010 lighting POS data could be available is late-February 2011. Analyzing and reporting on the 2008-9 and 2010 data at the same time could save time and budget. *Possible Report Date: June 2011.*

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[12] The advantages and disadvantages of these data sources can be found in the *California Residential Efficiency Market Share Tracking: Lamps 2007.*

[13] Each line item contains detailed information such as the manufacturer, UPC, watts, package size, price, and quantity sold.

[14] The California data are further subdivided into the California electric IOU service territories: Pacific Gas & Electric Company (PG&E), Southern California Edison (SCE), and San Diego Gas & Electric Company (SDG&E).

**Task 3: Purchase and Analyze the 2011 POS Data.** The 2011 lighting POS data could be available late-February 2012. This task would include the analysis of the 2011 data and updating the RMST Lamp Report with the new results. *Possible Report Date: May 2012.*

**Coordination with CLASS - Lighting**

If collecting data from other channels turns out not to be feasible, additional information may be able to be gathered in coordination with the residential on-site study. The on-site survey instrument for the previous CLASS Study already contains many of the fields required to capture the detail needed to be able to merge the data with the POS data. We propose that additional data be collected during the on-site surveys and that additional on-site surveys are completed targeting recent CFL purchasers. A more detailed methodology and budget will need to be developed if this option is chosen.

*Non-Lighting*

The list of targeted non-lighting equipment would need to be finalized during the Work Order Proposal phase of the study, but would likely include a subset of the following measures/end-uses: HVAC, appliances, water heaters, and other plug loads.

As discussed above, there are many advantages and disadvantages to collecting the various data types including: market actors' detailed sales data, market actors' self-reported, aggregated, information on sales, and residential customers' self-reported new purchases followed by on-site verification of detailed equipment specifications. The first task for tracking market shares of non-lighting measures is to do a feasibility study for collecting detailed sales data from market actors and then depending on the outcome, develop a detailed work plan for conducting the study which could ultimately rely on one or multiple of the data sources listed above.

Below is a brief description of the proposed feasibility study and how RMST could coordinate with the CLASS study to obtain detailed information on new purchases of the targeted measures.

**Non-Lighting Feasibility Study**

Similar to the proposed lighting feasibility study above, this task would include conducting a literature review and talking to other experts in the industry to determine if any recent studies across the country have had success in collecting detailed sales data from market actors. Coordinate with these entities to understand how they recruited retailers to obtain data and how to best replicate the method in California. Depending on the type of data collected and the feasibility of collecting similar data in California, the work plan will be revised to include the additional data in the analysis.

**Coordination with CLASS**

Similar to the proposed plan for the Non-Residential Market Share Tracking Study (NRMST), one option is that the non-lighting RMST coordinate with the residential on-site study (CLASS). The non-lighting portion of the Residential Market Share Tracking Study (RMST-NL) will integrate its recruitment and data collection effort with data collection needs for the CLASS study. Both studies will require large phone recruitments of residential customers. The phone recruitment efforts for the residential on-site study could incorporate a section asking customers about their purchases of new equipment. Residential customers will be asked to participate in the residential on-site study, the RMST-NL study, or both studies depending on their recent purchases and their willingness to participate. Customers that have purchased new equipment and are willing to participate in the extensive residential on-site study may be included in both the residential on-site study and the RMST-NL surveys. Residents that are new purchasers, but do not want to participate in the residential on-site study, will be asked to participate in the substantially shorter RMST-NL on-site data collection. Further, a multi-step recruitment effort will be made first without an incentive. If the respondent refuses, they will be offered an incentive.

Combining the recruitment for the RMST-NL and the residential on-site study will provide efficiencies in the phone survey development, the phone survey implementation, and the on-site survey data collection effort. The telephone recruitment for the residential on-site study and the RMST-NL may also collect information on customers' awareness, attitudes, and knowledge of energy efficiency and the utility energy efficiency programs. These surveys can also question customers about their decision making processes. The RMST-NL component of the survey will gather information on new purchases, the quantities and efficiency levels of the measures and any available pricing information. For those residences that agree to on-site data collection for the RMST-NL, the survey will be limited to verification and/or collection of information about the installed measure's characteristics and efficiencies.

***Budget***

The table below provides the estimated budgets for each task where possible.

**Table 7-9: RMST – Budget Options**

| Task | Estimated Cost | Notes |
|---|---|---|
| Lighting – POS Analysis and Reporting | $200,000-$250,000 | Includes purchasing and analyzing the 2010-2011 POS data as well as three reports: covering data from 2008-2009, 2010, and 2011. |
| Lighting – Feasibility Study | $50,000 | Does not include the collection and analysis of data if available. Est: $100-250k |
| Lighting – Coordination with residential on-site study | TBD | If this option is chosen, the scope and budget will be determined during the development of the residential on-site study Work Order. |
| NonLighting – Feasibility Study | $50,000 | Does not include the collection and analysis of data if available. |
| NonLighting – Market Actor Surveys | $100,000-$400,000 | Budget estimate includes a large range due uncertain measure list and which data collection method to use (detailed sales data vs. self reported, aggregated, information on sales) |
| NonLighting – Coordination with residential on-site study | $400,000-$800,000 | The specific scope and budget will be determined during the development of the residential on-site study Work Order. |

***Schedule and Key Next Steps***

The table below provides the proposed timeline for each task where possible.

**Table 7-10: RMST – Proposed Timeline**

| Activity | 2011 | | | | 2012 | | | | 2013 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 |
| Lighting – Feasibility Study | X | X | | | | | | | | | | |
| *Collect Additional Data** | | | *X* | *X* | *X* | *X* | | | | | | |
| Lighting – POS Analysis and Reporting – 2008-2009 | X | | | | | | | | | | | |
| Lighting – POS Analysis and Reporting – 2010 | X | X | | | | | | | | | | |
| Lighting – POS Analysis and Reporting – 2011 | | | | | X | X | | | | | | |
| Lighting – Coordination with residential on-site study | TBD | | | | | | | | | | | |
| Non Lighting – Feasibility Study | X | X | | | | | | | | | | |
| Non Lighting – Market Actor Data Collection | | | X | X | X | X | | | | | | |
| Non Lighting – Coordination with residential on-site study | X | X | X | X | X | X | X | X | X | | | |

* Dependent on the outcome of the feasibility study and timing of data collection.

### *7.1.6 Nonresidential Market Share Tracking*

***Summary of EM&V Activity/Study Area***

The Nonresidential Market Share Tracking project (NRMST) is a proposed study within the Energy Consumption, Saturation, and Market Share (Level 3) sub-group of Market Analysis (Level 2). A NRMST study would collect information on the market share of high efficiency and standard efficiency measures, the quantities of high and standard efficiency measures, and pricing information for these measures. The study would also collect information on commercial customer attitudes, awareness, and knowledge of energy efficiency measures and utility programs.[15] The NRMST research would question businesses on the factors commercial customers incorporate into their equipment purchasing decisions. The NRMST data would be collected using phone surveys, on-site surveys and surveys with vendors, distributors, and designers.

[15] The study would coordinate with the AKA-B study.

***Need and Application of Results***

*Background*

A Feasibility Study for nonresidential market share tracking was under taken in 1999,[16] while the most recent Nonresidential Market Share Tracking Study (NRMST) was undertaken in 2005.[17] The feasibility study was undertaken to determine the specific energy efficiency measures that would benefit from market share tracking and the alternative approaches available for undertaking a nonresidential market share tracking study. The Feasibility Study clearly described possible approaches for a NRMST study, the likely benefits associated with alternative approaches, and the costs associated with each approach. The Feasibility Study went on to recommend alternative approaches by measure and available budget.

The 2005 NRMST study relied heavily on secondary data and telephone surveys with market actors for the commercial aspects of the study and on-site and telephone surveys for the industrial customers. The commercial components of the 2005 NRMST survey focused on lighting, chillers, and windows. The study used data from the Nonresidential New Construction (NRNC) databases from 1993 and 1998 and interviews with market actors to determine the distribution of high and standard efficiency purchases for new construction and retrofit replacements for these three measure categories.

The NRMST study reported increasing use of T8 lighting relative to T12s in new construction while interviews with market actors on the distribution of T8 and T12 sales in California were consistent with the findings of the NRNC studies. The NRNC survey also provided information on the distribution of high and standard efficiency chillers installed in new constructions while market actor surveys described the distribution of process and space cooling between manufacturers and contractors. Unfortunately, the survey had little to report concerning the distribution between high and standard efficiency chiller retrofit installations in existing businesses, likely due in part to the data collection methods and the small number of retrofit chillers installed in any given year. The NRNC study also showed the increasing prevalence of two and three paned windows in commercial new construction which was further verified with market actor interviews in 2003. The increasing use of two and three paned windows was in part driven by the updates to Title 24 codes in 2001.

[16] Regional Economic Research, Inc. *Efficiency Market Share Needs Assessment and Feasibility Scoping Study.* Prepared for the California Board for Energy Efficiency and Pacific Gas & Electric Company. May 10, 1999.

[17] Aspen Systems Corporation. *Nonresidential Market Share Tracking Study – Final Report on Phases 1 and 2.* Prepared for the California Energy Commission. CEC 400-2005-013. April 2005

*Uses for Nonresidential Market Share Tracking Data*

Market share tracking data will be used to assess the current baseline efficiency of nonresidential measure sales, customer knowledge of and attitudes towards energy efficiency measures and IOU energy efficiency programs, and factors influencing the purchasing decisions of nonresidential customers. The data will help program planners better understand which measures, programs, and program delivery mechanisms are currently meeting their customers' needs and which need to be modified. The data will also help the CPUC assess where the current markets are relative to the long term market transformation goals and the HVAC initiative incorporated into the Strategic Plan. Data from the nonresidential market share tracking can also be used as inputs into potential and goals studies.

***General Approach, Issues, Studies/Activities***

*Overview/Options*

There are two primary approaches to gathering market share tracking data: phone and on-site surveys with recent purchasers and market actor surveys. Fully discussing the data collection options, their advantages and their liabilities and determining the optimal approach for the NRMST is part of the work order process. The following is a brief discussion of alternative approaches to gathering these data. A successful NRMST study may need to incorporate attributes of all approaches, depending on the measures to be studied and the success of the alternative approaches.

- **Vendor Surveys** – may collect detailed sales data on the sales of high and standard efficiency measures.
  - Advantages: These data represent actual sales of high and standard efficiency equipment. The data represents sales to multiple businesses. Once the vendor has agreed to provide these data, collecting the information can be less expensive than collecting data through on-site surveying.
  - Disadvantages: It is very unlikely that a substantial number of vendors will agree to provide these data. The RMST has previously collected vendor provided sales data. Over time, however, the number of vendors willing to provide these data has declined dramatically. The decline in vendor responses is likely a combination of an increase in concerns about confidentiality and respondent fatigue. It is likely that vendor sales data will be even more difficult to obtain from the limited number of commercial vendors. Vendors often consider these data proprietary information. In addition, once the sales data are gathered, the question of how to weigh the data and concern that high efficiency vendors may be more likely to participate than other vendors remains.

- **Vendor Surveys** may incorporate self-reported information on the vendor's perception of the percent of high efficiency measures they sell, their understanding of the percent of high efficiency measures sold in the market place, and their estimate of their and the market's annual sales.
  - Advantages: This information represents the knowledge of vendors selling to the commercial market place. The information gathered from a single vendor represents their knowledge of and sales to multiple businesses. Collection of vendor information is less expensive than on-site surveying and a single vendor can represent the information for multiple businesses.
  - Disadvantages: Information representing the perceptions of vendors may misrepresent the true distribution of sales. Vendors who traditionally sell a higher percentage of high efficiency measures may be more willing to participate than vendors selling more standard efficiency measures. It can be difficult to weigh the vendors' responses. Weighting can be particularly difficult if the responses of vendors are not in agreement.
- **Phone/On-Sites** –to locate recent purchasers of high and standard efficiency equipment, followed by on-site surveys to verify the purchases.
  - Advantages: These data represent actual purchases of high and standard efficiency equipment. The survey methodology would also enable the collection of information on awareness, knowledge, and attitudes toward energy efficiency measures and IOU energy efficiency programs.[18] These data also provide additional geographic and business type information that may assist program planners to better focus their future programs.
  - Disadvantages: Collecting market share data using phone and on-site surveys can be expensive, time consuming, and it can be difficult to locate individuals knowledgeable about equipment purchases. Coordinating the NRMST data collection effort with the Commercial End Use Survey will help to reduce the cost and the use of trained CATI surveyors will help to ensure that knowledgeable representative are interviewed.

For these reasons, the approach outlined below relies on phone and on-site surveys as the primary data collection effort while incorporating a vendor survey to supplement the data collected from equipment purchasers.

[18] The NRMST study would coordinate with the Awareness, Knowledge, Attitudes, and Behaviors study to ensure consistency in data collection where possible. Coordinating these studies will extend the quantity of information that can be collected on AKA-B and improve efficiencies of the two studies.

*Measures*

The NRMST study will first determine the measures or measure groups to be analyzed. The choice of measures is crucial to the success and usefulness of the study. Program tracking data and plans will be reviewed to ensure that the chosen measures are high impact measures in the IOU's program plans and/or measures included in the strategic plan. The chosen measures must also have a sufficient incidence of high and standard efficiency purchases to enable the team to locate nonresidential purchasers within the general business population. The NRMST study will limit its attention to four to six measures or measure groups. This focus will help to control the expense of the study while enabling the collection of crucial baseline information on the market share of measures important to the success of the IOU program plans and California's attempt to control electricity usage and greenhouse gas emissions.

Likely candidate measures and measure groups to be include in the study are lighting (linears, CFLs, and occupancy sensors), packaged air conditioning and chillers, plug loads (computers, copiers, printers, faxes), and limited refrigeration measures. Analysis of the purchases of T8s will provide information on the customer awareness of alternative generations of T8s, the factors influencing their choice among the alternative T8 generations currently available, and their knowledge of current IOU programs. This information will be very useful in future program planning efforts and in developing a current baseline for ongoing market transformation efforts. The study will review data collected during the 2006-2008 Small Commercial Program Evaluation[19] to help evaluate the need for, and the feasibility of, collecting information on incandescent and CFL bulb purchases. Information on the purchases of occupancy sensors will add to our understanding of this important, though easily over looked energy saving measure.

Collecting data on customer purchases of air conditioning units is crucial for helping to understand and limit peak demand. The team will research the feasibility of collecting information on packaged units and chillers. Potentially small sample sizes associated with chiller purchases may limit the ability to determine the market share of efficient chillers.

The NRMST study will collect information on plug loads and their efficiency levels to provide baseline data on the efficiency distribution for this rapidly growing source of energy demand. Additional measures will be vetted during the program planning process to determine the complete list of measures to be included in the NRMST study.

[19] As part of the 2006-08 Small Commercial Evaluation, nearly 10,000 IOU customers were surveyed about their current lighting equipment in use, typical lighting purchasing habits, and recent CFL and incandescent purchases.

*Coordination w/ CEUS*

The Nonresidential Market Share Tracking Study will integrate its recruitment and data collection effort with data collection needs for the commercial on-site study. Both studies will require large phone recruitments of nonresidential customers. The phone recruitment efforts for the commercial on-site study will incorporate a section asking businesses about their purchases of new equipment. Businesses will be asked to participate in the commercial on-site study, the NRMST study, or both studies depending on their recent purchases and their willingness to participate. Businesses that have purchased new equipment and are willing to participate in the extensive commercial on-site survey, may be included in both the commercial on-site survey and the NRMST surveys. Businesses that are new purchasers, but do not want to participate in the commercial on-site survey, will be asked to participate in the substantially shorter NRMST on-site data collection. Further, a multi-step recruitment effort will be made first without an incentive. If the respondent refuses, they will be offered an incentive. This process proved effective in the 2006-2008 Small Commercial Program Evaluation for recruiting upstream CFL purchasers in both reducing costs and non-response bias.

Combining the recruitment for the NRMST and the commercial on-site survey will provide efficiencies in the phone survey development, the phone survey implementation, and the on-site survey data collection effort. The telephone recruitment for the commercial on-site survey and the NRMST will also collect information on customers' awareness, attitudes, and knowledge of energy efficiency and the utility energy efficiency programs. These surveys will also question businesses about their decision making processes. The NRMST component of the survey will gather information on new purchases, the efficiency levels of the measures and any available pricing information. For those businesses that agree to on-site data collection for the NRMST, the survey will be limited to verification and/or collection of information about the installed measure's characteristics and efficiencies.

Ideally the NRMST survey would incorporate both commercial and industrial businesses. Attempting to begin tracking in both nonresidential sectors, however, would be time consuming, expensive, and might divide the team's focus. The limited success of 2005 NRMST efforts which attempted to collect information in both the commercial and the industrial sectors, combined with the importance of collecting these data, has led to the decision to focus the NRMST within the commercial sector. This decision will also facilitate the joint execution of the NRMST and the CEUS surveys in an attempt to maximize possible efficiencies of undertaking these surveys within the commercial sector simultaneously.

The NRMST study will undertake on-site surveys with 200 to 250 businesses for each of the four to six measure groups, leading to a total sample size of approximately 1000 businesses. Businesses that have purchased multiple measures will be included in the study for all measures they have purchased which are eligible for the study.

*Vendor Surveys*

The Non-Residential Market Share Tracking study will supplement the phone and on-site surveys with information collected from vendors. Vendors will be contacted and asked to provide data on market sales of base and high efficiency measures. If the vendors are unwilling to provide these data, they will be asked to provide information on their perception of the share of high and standard equipment measures purchases. This information will be triangulated with the data gathered during the phone and on-site surveys.

***Budget***

**Table 7-11: NRMST – Budget Options**

| | Est Cost | Assumptions | Notes |
|---|---|---|---|
| IOU Data/Sample Design | $100,000 | | If coordinated w/ commercial on-site survey – little to no additional costs |
| Phone Surveys/Recruitment | $144,000 | On-Site recruitment of 1,200 purchasers | If coordinated w/ commercial on-site survey – little to no additional costs for the first year |
| On-Sites | $360,000 | 1,200 verification on-sites | If coordinated w/ commercial on-site survey – half the costs the first year |
| Multi-Step Quality Control/Data Entry | $120,000 | | |
| On-Site Incentives | $60,000 | $100 per on-site Assumes half will require an incentive | (SmCom Upstream Survey = 40% of recruited sites received an incentive) |
| Vendor Surveys | $200,000 | | |
| Analysis/Reporting | $200,000 | | |
| **Total** | **$1,184,000** | | |

***Schedule and Key Next Steps***

Given the proposed timeline for the CEUS study and the need to coordinate with that study to keep costs at a minimum, efforts should be made to begin the study in the first quarter of 2011.

**Table 7-12: NRMST – Proposed Timeline**

| Activity | 2011 | | | | 2012 | | | | 2013 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 |
| IOU Data/Sample Design | X | X | | | | | | | | | | |
| Phone Surveys/ Recruitment | | | X | X | X | | | | | | | |
| On-Sites | | | X | X | X | X | | | | | | |
| QC, DE, etc | | | | X | X | X | X | | | | | |
| Analysis/Reporting | | | | | | X | X | X | | | | |

*NRMST Timing*

Depending on the availability of future budgets, the NRMST study should be undertaken every program cycle or every two to three years. The proposed NRMST will incorporate a vendor survey and will coordinate the phone and on-site survey with the CEUS. This approach will help to reduce the cost of data collection. Future NRMST studies should coordinate the data gathering steps with other commercial on-site surveys. Coordination of these surveys will help to limit travel costs through the scheduling of multiple surveys in a geographic location.

## 7.2 Market Structure and Decision Making

### *7.2.1 Summary*

The study of market structure and decision making is concerned with understanding the mechanisms and processes governing the exchange of energy-related goods and services. Activities in this area provide both measurement and characterization of these mechanisms. Objectives range from documenting the roles of market actors and surveying available products, services and trade volumes, to the internal decision making processes and drivers of market participants. These activities seek to understand the technical, procedural and psychographic landscape within which energy programs operate. These activities also seek to collect and apply knowledge of this landscape to inform new program design and deployment.

### *7.2.2 Need and Application of Results*

Market structure and decision making research is needed to support optimal adaptation and development of cost-effective and forward looking intervention strategies. It also serves as a baseline in support of the measurement of market effects and specific program accomplishments. Finally, it serves to enhance the development of new programs as well as early detection of market momentum that can serve to reprioritize program objectives and the barriers addressed therein.

### *7.2.3 General Approach, Issues, Studies and Research Activities*

Market structure and decision making is comprised of four primary research areas, including market characterization, AKA-B[20] metrics and measurement, new and enhanced program research, and standard practice assessment. Each of these elements is described below.

***Market Characterization***

The goal of market characterization is to gain specific insight to the functioning of markets that will support improved strategic and policy decisions. Market research is conducted through the systematic gathering of data and analysis of information on a variety of dimensions describing the exchanges, individuals and organizations, which together comprise a marketplace.

*Structure and Operations*

Market structure and operations research develops a profile of the components and functioning of target markets. This includes an assessment of market size, including the number of buyers and sellers, the balance of market power and market dynamics, and the mechanics of trading. It will examine supplier business models and supply chains, cost structures, related capital markets, supplier entry conditions, and competitive and financial pressures of market participants. Product differentiation and related price and cost attributes should also be visited. There should be research regarding market trends and market evolution and outlook. Particular emphasis is placed on documenting market mechanisms surrounding the demand and distribution of energy efficient products and services. This work will ultimately provide for the construction of a model of market participants and their roles and relationships, with careful attention to the mechanisms underlying the current provision of energy efficient products and services.

*End-user characterization*

End-user characterizations provide a foundation for building cost-effective targeted informational campaigns, price incentives, and other market intervention strategies. It identifies opportunities for program intervention, as well as areas where markets are relatively mature and call for little to no intervention. End-user characterization examines preferences, practices and management structures, with an emphasis on the ways these relate to critical energy consumption decisions, patterns and energy investments. The goal is to characterize the role of energy costs and end-user preferences in the context of other constraining factors to better understand energy related decisions and behavior. Another goal is to determine how consumers may perceive value in the energy efficiency offering in order to inform marketing and communication effectiveness. This study area should profile targeted populations in their perceptions of equipment performance uncertainty, access to capital, competing concerns, and other barriers to energy

[20] Awareness, knowledge, attitudes and behavior.

efficient equipment adoption and energy efficient behaviors. Moreover, it should yield an understanding of critical intervention points and decision drivers to enhance market intervention strategies.

End user analysis should also yield information that will effectively and meaningfully support segmentation of the target population into similarly motivated groups. Segmentation may draw on geographic differences, psychographic differences, demographic differences, and/or use of product differences.

Integral to the characterization of both markets and their component actors is the study of relevant practices and behaviors pertinent to energy efficiency goals and program strategies. For example, AC installation and maintenance practices, various aspects of compliance with codes and standards, corporate energy management policies and procedures, and more could be explored.

*Leadership and Innovation*

In the study of markets, particular attention should be afforded to the characterization of organizations and other market actors that demonstrate ideals in leadership and innovation consistent with progress toward California's energy goals. The salient characteristics of sub-populations that support substantive progress toward energy conservation are important to study and understand. They serve as models for new strategic development, as well as providing naturally occurring avenues of support that can be enhanced and promoted through new programs. In-depth characterization of leadership, innovation and other embodiments of strategically ideal behaviors serve to further the development of methods to effectively engage market actors.

*Market Structure and Operations in Other States*

There is sometimes the need to study the characteristics of markets in other states. Such studies can serve as baseline metrics for the measurement of accomplishments of programs implemented statewide in California, or they may provide evidence of possible outcomes arising from a particular policy or legislative approach enacted in other jurisdictions and under consideration in California.

### ***AKA-B Metrics and Measurement***

Attitudes Knowledge Awareness – Behavior (AKA- B) plays an important part in many program theory and logic models. It illustrates the perception and informational barriers in the path toward energy efficient behavior, and supports the development of behavioral theories around

which existing programs can be refined or new programs created that effectively bridge those barriers to further portfolio goals.

It illustrates the perception and informational barriers in the path toward energy efficient behavior, and supports methodological theory related to the effective bridging of those barriers to further program and portfolio goals.

AKA-B study focuses on determining meaningful descriptors and market segmentations that profile the state of consumers along a psychographic, informational and relational continuum with respect to goals in energy efficient behavior and adoptions. This study area will provide a deeper understanding of where in the continuum from awareness to behavior the process breaks down, and what sociological phenomenon are at play during critical aspects of the process and break down. This study is critical for successful tailoring program strategy, messages and information to achieve the greatest possible impact.

Factors that influence the efficacy of messaging include self efficacy, attitude accessibility, issue involvement, and the specific message and source. Attitudes have varying degrees of resistance to change and new information. Attitudes may be difficult to measures since those privately held may not be consistent with those publicly stated, making some attitudinal metrics at best indirectly related to actions. Self efficacy is a perception of one's ability to affect chance or outcome. Lower degrees of self-efficacy create greater barriers for effective messaging.

Moreover, understanding the dynamics and current state of AKA-B in target markets better identifies underlying barriers to the program goals in market evolution. This type of research will study the specific mechanisms by which the targeted change is achieved, as well as providing data and techniques through which progress can effectively be measured. Aspects of AKA-B measurement can also serve as an important metric of program market effects, and aggregate market evolution over time.

A critical aspect of AKA-B metrics is that they be offered in the context of a measured relationship to actual behavior. For example, if awareness of a particular issue or attribute does not hold an observable relationship with behavior, this is a key finding to inform program goals and methods. The more critical outcome of the study is understanding why or how awareness and knowledge fails to lead to adoption, and what strategies can be used to address this underlying barrier. Similarly, attitudes are strongly influenced by the perception of value – i.e., one can have a favorable attitude but if there is no perceived value then one may still not act (even if one "likes" the idea).

***New/Enhanced Program Research***

New and enhanced program research is the study of markets with a focus that goes beyond documentation of current market phenomenon, and into the areas of specific adaptation to program constructs already in place or forming. This research is directed at furthering the development specific opportunities offered by newly conceived programs strategies. This might be research that refines the understanding of needs and wants around an already targeted intervention such as workforce training, or financing. This could also be more speculative and forward looking with a view toward experimental design, or directed R&D funding for emerging technologies.

This study area houses the synthesis of findings on market structure, operations and end user characterizations, and forms actionable recommendations and related theories surrounding newly fashioned market intervention and program strategy.

***Standard Practice Assessment***

A market study designed to provide data regarding the appropriate baseline efficiency with respect to a specific product, service or behavior will fall into the 'standard practice assessment' category. This arena has obvious overlap with impact studies, and possibly market share tracking. Nonetheless, the need may arise to study standard practices within a targeted market that is not covered in current impact and MST studies. The practice may relate to an emerging technology, a niche market, a nuance of an existing and well understood market, or a practice that relates generally to many measures rather than exclusively to one measure.

***Overview of Studies and Research Activities***

As discussed in Chapter 3, specific EM&V studies and research activities have been assigned a primary activity area or "home" in this EM&V plan, but in reality many studies will be designed to address multiple EM&V topics and research activities. Within the category of Market Structure and Decision Making, only a couple studies fit neatly under a particular category (e.g. Measurement and Reporting on AKA-B Metrics) while other projects support multiple objectives and provide funding to study EM&V topics from more than one category. In particular, most of the studies that have been assigned to Market Structure and Decision Making as their primary home will also provide funding to study EM&V topics falling under other Market Analysis categories (Energy Consumption, Saturation and Market Share tracking). A couple of studies also support topics falling within Planning and Policy or Program Delivery and Implementation Assessment research areas.

With this context, Table 7-13 presents a complete list of EM&V studies that will address research topics within Market Structure and Decision Making. These studies will also address research topics in other categories as shown.

Table 7-13 also shows which studies are ED-managed and which IOU-managed studies. The differences between ED-managed and IOU-managed studies are discussed in Section 5.2.

**Table 7-13: Summary of EM&V Studies within Primary Home of Market Structure and Decision Making**

| Sector | Program Focus | Study Name | 2010-2012 EM&V Project Budget | Study Manager | Level of Effort by EM&V Research Activity Area: | | |
|---|---|---|---|---|---|---|---|
| | | | | | MSD | Other | Other Specify |
| Res | All | Overarching Residential Sector Market Assessment | $300,000 | ED | 70% | 30% | EC, S, MS |
| Nonres | All | Overarching Nonresidential Sector Market Assessment | $300,000 | ED | 70% | 30% | EC, S, MS |
| Nonres | All | Industrial Sector Market Characterization Study | $225,000 | IOU | 50% | 50% | S |
| Nonres | All | Agricultural Sector Market Characterization and Potential Study[1] | $400,000 | IOU | 40% | 60% | EC, S |
| CC | All | Building/Facility Renovation/Remodel Rates Study | $300,000 | IOU | 50% | 50% | P |
| Res | All | Consumer Preference Research to Support Lighting Programs[2] | $150,000 | IOU | 100% | 0% | |
| CC | All | Measurement and Reporting on AKA-B Metrics | $250,000 | ED | 100% | 0% | |
| Res | All | CEE Energy Star Awareness Survey[1] | $30,000 | IOU | 67% | 33% | PDIA |

[1] Studies utilized 2009 EM&V funding.
[2] Studies not utilizing EM&V funded (paid for with program implementation funding).

*Key:*
*Program Delivery and Implementation Assessment (PDIA), Market Structure and Decision-making (MSD), Measure and Program Impacts (I), Program and Measure Costs (C), Energy Consumption (EC), Saturation (S), Market Share (MS), Manage EM&V (M), and Planning and Policy (P)*

***Study Scope and Management***

The following briefly describes key components of each of the EM&V studies included in Table 7-13.

**Overarching Residential Sector Market Assessment, and Overarching Nonresidential Sector Market Assessment.** Two ED-managed studies focus on overarching market structure and decision making components; one focused on the residential sector and one on the nonresidential sector. The goal of these studies is to provide funding for ED-managed research and analysis designed to address overarching issues, including AKA-B related issues, market characterization, program innovation and opportunity assessments, and standard practice research. Similar to the ED-managed studies described above, these studies will draw on primary research conducted as part of other studies but may also include stand-alone research to fill gaps, will provide interim reports as well as more annual and final reports documenting the full effort, and, as appropriate, will report on results related to PPMs, MTIs and other strategic planning goals and objectives.

**Industrial Sector Market Characterization Study.** The goal of this study is to characterize energy use and energy efficiency in the CA industrial sector. The study will develop and present data on the CA industrial sector, including end use consumption estimates, load shapes, key end uses and measure to target for energy efficiency, and a gap analysis between potential and recent program accomplishments.

**Agricultural Sector Market Characterization and Potential Study.** This study will be designed to identify opportunities for energy efficiency, demand response and self-generation within the agricultural sector. Components of this study may include a literature review, market and energy usage characterization, a customer needs assessment, gap analysis, saturation and baseline analyses for specific technologies, and a potential study for the most promising opportunities.

**Building/Facility Renovation/Remodel Rates Study.** This study will develop updated estimates of renovation/remodel rates by building type, CZ, and vintage.

**Consumer Preference Research to Support Lighting Programs.** This study is being managed by PG&E using 2010-2012 program funds. ED will continue to provide input in the study design, analysis and results reporting. It is expected that the study will provide guidance for key program design considerations including product mix, incentive levels and allocation among distribution channels.

**Measurement and Reporting on AKA-B Metrics.** This study will develop and measure baseline and ongoing AKA-B metrics, overall and for specific segments, reporting on changes over time and key drivers of changes.

**CEE Energy Star Awareness Survey.** This is an IOU-funded effort to obtain a CA over-sample from the national CEE Energy Star Awareness Survey.

### *7.2.4 Budget*

A total of $1.4 million has been budgeted for 2010-2012 EM&V studies with a primary home of Market Structure and Decision-Making, as shown in Table 7-13. It is estimated that 35% of the total EM&V funding for these studies will be directed at assessing issues related to other EM&V research areas, including other Market Analysis topics (Energy Consumption, Saturation and Market Share), Policy & Planning, and Program Delivery and Implementation Assessment. However, most of the funding for Market Structure and Decision Making research will come from studies with their primary home in the Program Design and Implementation Assessment area. These studies have a total budget of $17.8 million, and are expected to allocate 19% (or $3.4 million) of the total budget to Market Structure and Decision Making research.

### *7.2.5 Schedule and Key Next Steps*

Table 7-14 below summarizes the schedule and critical milestones related to Market Structure and Decision Making studies. Final reports will be completed by the end of the second quarter of 2013. Project planning will be completed before the end of the second quarter of 2011. Key next steps include project planning, issuance of RFPs and the executing of contracts. Studies will provide early feedback memorandums providing timely feedback and recommendations, and/or to summarize key interim findings related to a study milestone such as results of professional interviews, participant surveys or the completion of a literatures review. Early feedback memorandums are expected to commence in the third quarter of 2011 and continue through the second quarter of 2012. Studies will provide quarterly results reports, which provide study updates and summarize findings and accomplishments for the quarter. Quarterly reports should begin the third quarter of 2011 and continue through the second quarter of 2013. Similarly, annual reports will summarize results over the previous calendar year, and are to be submitted before the end of the first quarter of 2012 and the first quarter of 2013.

**Table 7-14: Market Structure and Decision Making Studies – Proposed Timeline**

| | 2011 | | | | 2012 | | | | 2013 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Activity** | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 |
| Start-up / Project Planning | X | X | | | | | | | | | | |
| Issue RFPs / Execute Contracts | X | X | X | X | X | | | | | | | |
| Implement Studies | | X | ...On-going... | | | | | | | X | | |
| Early Feedback Memos | | | X | X | X | X | | | | | | |
| Quarterly Results Reports | | | X | X | X | X | X | X | X | X | | |
| Annual Reports | | | | | X | | | | X | | | |
| Final Reports | | | | | | | | | | | X | |

# 8

# Managing EM&V, Compliance, & Reporting

## 8.1 Manage EM&V

### *8.1.1 Summary of EM&V Activity/Study Area*

This activity area and budget item covers activities and expenses related to the management of the entire EM&V process funded through the 2010-2012 EM&V funding allocation. The expenses in this area include both contracted and in-house labor that is distributed across the entire portfolio of EM&V projects, as well as discrete projects with more specific goals that are integral to managing the overall EM&V process. The budget is intended to cover the following expenses:

- Overall EM&V Management Labor
  - IOU EM&V Staff Costs
  - A Portion of ED EM&V Staff
  - A portion of Energy Division's Advisory Consultant costs
  - A portion of Data Management and Quality Control contractor costs
  - A portion of Itron and KEMA EM&V management costs
- Upfront and Continuous EM&V Planning and Communication including all costs incurred in the course of preparing and revising the EM&V work plan
- Development and Implementation of Overall EM&V Management Processes
- EM&V Project Management, Quality Control, and Related Support
- Data management resources not explicitly covered by the ED Reporting activities, such as warehousing of EM&V reports and data
- Consultant labor costs incurred in the course of workshops and EM&V planning activities ordered by Decision 10-10-033
- EM&V methodology development studies, such as updates to the EM&V Protocols, EM&V guidance documents, and EM&V best practices studies.

### *8.1.2 Budget*

EM&V Management-related Studies - $2,000,000

IOU EM&V Staff - $15,250,000

ED EM&V Staff - $3,000,000

ED Consultant Management and QC Support - $10,000,000

## 8.2 Ex Ante Development and Approval

### *8.2.1 Summary of EM&V Activity/Study Area*

This activity area addresses the further development, updating, and approval of *ex ante* impact and cost values along with all relevant underlying and associated parameters.[1] Under the direction of the Energy Division, it includes updates and improvements to the Database of Energy Efficiency Resources (DEER), which includes a large number of efficiency measures whose values IOUs are directed to use under CPUC policy. It also includes related analytical activities to support the Energy Division in its responsibility to review and approve ex ante values for measures not included in DEER – so-called "non-DEER" measures - or to require modification of such non-DEER estimates and assumptions where necessary and appropriate under commission policy. This activity area also includes technical support for the Energy Division for its review of all utility "work papers", which the IOUs are required to provide as documentation associated with their program cycle and compliance filings of ex ante measure, program, and portfolio impacts, costs, and cost effectiveness.

### *8.2.2 Need and Application of Results*

Ex ante values are energy efficiency impact and cost estimates developed prior to or during implementation of programs and prior to installation of the measures by end users. Ex post values are estimates of savings that are informed by observation and measurement of savings or factors related to savings that occur after energy efficiency measures have been implemented. For each program cycle, California IOUs are required under CPUC policy to file ex ante estimates of key parameters associated with measure and program impacts, costs, and cost effectiveness. In this context, efficiency measures generally fall into two types: "deemed" and "non-deemed". The former refers to measures that have a set of characteristics, applications, and

[1] The term ex-ante is a neo-Latin word meaning "before the event". Ex-ante is used most commonly in the commercial world, where results of a particular action, or series of actions, are forecast in advance. The opposite of ex-ante is ex-post, which refers to actual observance or measurement of actual performance. These terms have been in common use in the energy efficiency program planning, evaluation, and regulatory policy and oversight fields for over two decades.

existing body of knowledge that combine to provide a reasonable ability to forecast measure impacts and costs on average (e.g., energy savings associated with the installation of a specific lighting technology in a relatively homogenous commercial business type); while the latter term refers to measures that are either very unique in features or applications (e.g., a highly customized and site-specific industrial process modification) or for which there is little existing empirical information to support meaningful ex ante generalization (e.g., a very newly commercialized technology). In the CPUC regulatory context, "deemed" and "non-deemed" are generally associated with DEER and non-DEER since DEER is the CPUC-managed repository of approved ex ante impact and cost-effectiveness related values.

From a regulatory agency perspective, DEER has been the preferred source of ex ante data in California since its inception in the early 1990s. DEER was conceived and developed to improve, standardize, and rationalize ex ante energy efficiency impact and cost effectiveness values. Such standardization was critical to a variety of planning, forecasting, and regulatory oversight activities. In the absence of DEER or a DEER-equivalent, each utility (or program implementer) would make its own estimate of impacts, costs, and related parameters for hundreds of measures in thousands of applications. The result would be, and has been at various times in the past, significant unexplained and empirically unjustifiable variation in ex ante values for the same measures and parameters across utilities and programs. Use of inconsistent ex ante values in the past also has resulted in lengthy and resource-inefficient review processes.

A central objective of DEER is to provide a standardized database of values that reduces inconsistencies and increases the timeliness and efficiency of the ex ante-related aspects of energy efficiency program and portfolio filings and associated regulatory review. Over time, the regulatory importance of DEER has increased as the scale of energy efficiency program activities and investments have expanded in response to more significant regulatory and state energy policy goals and expectations. There are numerous regulatory references to DEER and the Energy Division's related oversight of non-DEER and IOU work paper review, including within the CPUC's 2010-2012 Energy Efficiency Portfolio decision,[2] the 2010-2012 EM&V decision,[3] and the CPUC's Risk-Reward Incentive Mechanism (RRIM) proceeding. DEER and ex ante development, review, and approval more generally continue to be called out as important elements of the CPUC's energy efficiency requirements and policies in current and forward-looking proceedings.

[2] *Decision Approving 2010 to 2012 Energy Efficiency Portfolios and Budgets*, Decision 09-09-047, September 24, 2009. A prior June 2, 2008 Ruling in R.06-04-010 required use of final DEER 2008 Update values, posted on May 30, 2008, in the utilities' 2009-2011 energy efficiency portfolio applications.

[3] *Decision Determining Evaluation, Measurement and Verification Processes for 2010 through 2012 Energy Efficiency Portfolios*, Decision 10-04-029, April 8, 2010.

### *8.2.3 General Approach, Issues, Studies/Activities*

Ex-ante estimates will be developed and approved based on best available data and methodologies. Activities will include updates to the DEER database as well as review and approval of non-DEER, IOU work papers and associated impact and cost parameters. Activities include (1) adding new measures, (2) gross and net impact parameter updates, (3) statistical analysis and mining of existing sources to support developing ex ante updates, (4) measure cost analysis and updates,[4] (5) useful life and technical degradation updates, (6) software and documentation upgrades, and (7) coordination with 2010-2012 impact evaluation and cost data collection and analysis activities.

***2010-2012 DEER Update***. The scope of the DEER update includes the following tasks:

- Task 1 Kick-Off Meeting
- Task 2 Project Planning and Prioritization Analysis
- Task 3 Technology Workgroup Meetings
- Task 4 Update and Improve User Interface
- Task 5 Software Improvements
- Task 6 Net to Gross Analysis
- Task 7 Energy Savings Analysis
- Task 8 Peak Savings Analysis
- Task 9 Useful Life Analysis
- Task 10 Transforming Workpaper (Non-DEER) Measures to DEER
- Task 11 Incremental Cost Analyses
- Task 12 Draft and Final Database and Reports
- Task 13 Public Workshops
- Task 14 User Support
- Task 15 Project Management

***Impact Evaluation Coordination***. As discussed throughout the other elements of this 2010-2012 EM&V plan, EM&V and related research efforts will be conducted for many measures, programs, and markets to update and improve baseline parameters and measure and program impact estimates. Given the high regulatory importance placed on development and approval of ex ante values, key elements of 2010-2012 evaluation studies must be designed and implemented with DEER and ex ante needs in mind. This activity area will focus on prioritizing and ensuring

[4] More extensive primary cost research will be implemented in the Program and Measure Cost EM&V activity area.

attention to measure-level estimation of savings and associated parameters, coordinating reporting of results in DEER and cost effectiveness-compatible formats, developing recommendations for how to best use evaluation and baseline results in DEER, and supporting efforts needed to provide a portion of EM&V results early enough in the current program cycle to influence development and approval of next cycle ex ante values.

***Support Ex Ante Development, Review, & Approval (includes non-DEER)***. This study area provides technical consulting to support Energy Division's review and approval of IOU ex ante values. IOU filings, work papers, cost effectiveness calculations, and tracking systems will be reviewed to confirm correct use and application of DEER values for DEER measures. For non-DEER measures and parameters, methods, data, sources, and assumptions will be reviewed to assure use of best-available information. As requested by Energy Division, new or modified methods, data, and sources may developed for non-DEER measures. Activities include review and approval of ex ante values for the cycle following 2010-2012, as well as any CPUC-required on-going ex ante review and approval for the current cycle (e.g., for non-DEER measures inclusive of site-specific custom ex ante estimates).

### *8.2.4 Budget*

DEER: $4,000,000

Support Ex Ante Development, Review, & Approval (includes non-DEER): $2,000,000

### *8.2.5 Schedule and Key Next Steps (High level, by quarter or half year for types of major activities/milestones)*

| | 2010 | | | | 2011 | | | |
|---|---|---|---|---|---|---|---|---|
| **Activity** | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 |
| Project and Research Planning | X | X | | | | | | |
| Technology Team Initiation and Prioritization | | | X | X | | | | |
| Software Upgrades | | X | X | X | | | | |
| Data Collection and Analysis | | | | X | X | X | X | |
| Draft Results | | | | | | X | X | |
| Final Results | | | | | | | | X |

## 8.3 ED Reporting

### *8.3.1 Summary of EM&V Activity/Study Area*

This activity area will focus on Energy Division's regulatory-related reporting requirements for energy efficiency. This will include data management activities associated with IOU submittals of program accomplishments and all associated tracking and reporting compliance data. It will also include all Energy Division management, analysis, and reporting activities associated with integrating program, portfolio, and market analysis results into regulatory-required reports of overall IOU energy efficiency impacts, costs, and cost effectiveness.

### *8.3.2 General Approach, Issues, Studies/Activities*

Activities within ED Reporting will likely include but are not limited to:

- Development and Oversight of IOU Reporting, Data Requirements, and Procedures
  - Data Tracking and Reporting System Enhancements
- Integration, Analysis, and Reporting of:
  - Portfolio, Program, & Measure Costs
  - Cost Effectiveness
  - Goals Attainment
  - Risk-Reward Incentive Mechanism
- Updates and Maintenance of Energy Efficiency Websites (DEER, EEGA, CMS, CALMAC, etc.)
- Cost-effectiveness Tool Development
- Avoided costs and GHG Emissions Updates
- Management and Support of Studies and Analyses of Resource Procurement and Supply-Side Planning-Related Impacts

***Development and Oversight of IOU Reporting, Data Requirements, and Procedures***

One of the Energy Division's core reporting requirements for the utilities is to provide a standardized set of utility tracking data, referred to as the Standardized Program Tracking Database or SPT db, for the 2010-2012 program cycle. The SPT db will allow the Energy Division and its consultants to have one set of source data that will serve multiple purposes, including serving as the basis for EM&V sampling, utility claims reporting, ex-ante reporting out to the public, and for ex-post updating.

The 2010-2012 SPT db will be created in a collaborative effort between Energy Division, Energy Division consultants/contractors, and the IOUs. This team will be responsible for ensuring that the SPT db is consistently developed across the utilities and that only data that passes data validation tests, developed by this team, are accepted by Energy Division as an official claim. In addition, this team will develop the data aggregation rules in close coordination so the SPT db records can be compressed in a transparent and agreed upon manner.

Finally, the validated and aggregated SPT db records will be processed through a cost effectiveness model by the Energy Division, but the IOUs will help develop this process, thus making the data transformation and cost effectiveness calculation process for transparent.

***Project Management Reporting***

To better manage the internal work processes for the 2010-2012 EMV cycle, some resources will be allocated to develop tools that will allow Energy Division to better manage the projects, finances, and field work that will be ongoing over the next three years.

- ***Project Management –*** MS Project will be used by the contractors and sub-contractor to manage the tasks and sub-tasks that are defined in the work order process for all EMV projects. MS Project will allow Energy Division staff to identify tasks that are on schedule or behind schedule on a project by project or on a global level. There will be a web-based user interface that will provide various reporting options for Energy Division staff.
- ***Detailed Project Expenditures –*** An MS Access database will be developed that will allow Energy Division staff to query the detailed expenditures by contractors, by date, by project, and by task. This expenditure reporting will be developed in close coordination with the MS Project tool so Energy Division staff can link expenditures and project accomplishment reporting
- ***On-line Monitoring of Field Visits -*** Resources will be allocated to utilize an existing system that will help Energy Division better manage all the field work that will occur over the next three years. This system will allow sites to be tracked on Google Earth, and Energy Division staff will quickly be able to determine if the field work is not turning over quick enough to meet the sample quotas or project deadlines.

***Maintenance of Energy Efficiency Websites***

Energy Division has developed a suite of websites that will need to be maintained over the next three years.

- ***Contract Management System (CMS) –*** This website is used by Energy Division staff to review and approve/reject invoices submitted by Energy Division contractors/consultants. In addition, this site also houses the ***Public Download Area,*** the website that allows members from the public to comment on Energy Division projects and draft/final reports.
- ***Energy Efficiency Groupware Application (EEGA) –*** This website will be the central location for all Commission required utility reports, including monthly reports, narratives, annual reports, Program Performance Metrics reports, Fund shifting reports, as well as the 2010-2012 Standardized Program Tracking database records. Data requests from Energy Division or its consultants to the IOUs will also continue to be made through this website.

***Cost Effectiveness Tool Development***

This study area will cover review, assessment, and updating of tools to calculate cost-effectiveness for measures, projects, programs, and portfolios.

***Savings Decay and Cumulative Goals Analysis***

This study will estimate the effect on cumulative goals of measures with short measure lives and concomitantly examine the likelihood of re-adoption of such measures at the end of their initial service life. The results of this analysis will be compared to the current CPUC policy requirements that IOUs must replace 50% of the savings associated with short-lived measures to meet cumulative goals requirements.

***Energy Efficiency Load Forecasting Integration***

This study will continue work on introducing stochastic/probabilistic modeling approaches for EE resources into load forecasting and procurement. It will also continue work efforts to harmonize inputs and methods for CEC load forecast and CPUC Potential and Goals Study.

### *8.3.3 Budget*

$2,850,000

# 9

# Regulatory Planning and Policy Support

## 9.1 Efficiency Potential and Goals Studies

### *9.1.1 Summary of EM&V Activity/Study Area*

An energy efficiency potential study and a goals study are studies within the Regulatory, Planning, and Policy Development (Level 2) sub-group of Management, Policy, and Planning (Level 1). Under the direction of the Energy Division, the study area activities will include the updating of potential modeling parameters, the development of gas and electric potential forecasts by utility, sector, climate zone, and measure, and the formulation of potential goal savings values which incorporate changes in energy efficiency standards. The potential and goals studies for the current EM&V cycle will provide important updates to energy efficiency forecast that will be used to update the IOU savings goals for 2014-2024, to help the CEC estimate statewide potentially achievable cost-effective electric and natural gas efficiency savings, and to assist with IOU program and portfolio planning.

### *9.1.2 Need and Application of Results*

***Background***

In Decision 08-07-047, the Commission adopted interim energy efficiency savings goals for 2012 through 2020 for electricity and natural gas based on a total market gross (TMG) basis. The Decision also ordered that the TMG goals be updated by October 2010. The Decision gave the Commissioner and/or Administrative Law Judge authority to adjust the schedule for updating the TMG goals if necessary. Due to the ED staffs' obligations, the staff did not complete the update by October 2010. The staff has prepared a white paper with staff recommendation on possible options to proceed with the potential study and the goals update.

California IOU Potential Studies have been undertaken in 2002, 2006, and 2008. The Potential Studies were undertaken to provide the Energy Division, the CEC, and the IOUs with information on the quantity and location of cost-effective energy efficiency potential savings. Prior to these statewide efforts, the IOUs undertook individual efforts. The statewide nature of the past three studies has ensured that the inputs are consistent and the potential study output consistently estimate potential energy efficiency savings.

The Potential Studies develop estimates of savings by utility, climate zone, sector and measure. The estimates of savings potential include forecasts of technical, economic, and achievable potential. The estimates of achievable potential include scenario estimates that incorporate alternative levels of incentives, avoided costs, and economic growth. The potential forecasts were developed for the residential, commercial, and industrial sectors for existing and new construction.

***Applications***

The findings from the Potential Studies were used by the IOUs to plan and focus their programs. The Potential Study results were used to help fulfill the CEC's requirement to estimate all potential achievable energy savings for the state of California and establish statewide savings targets (Assembly Bill 2021). AB 2021 requires the CEC to estimate savings and establish new ten year targets every three years. The Potential Study also fulfilled the requirements of Senate Bill 1037 that requires the Commission to estimate IOU energy efficiency potential and establish savings targets (there is no specified frequency in SB 1037). The Study results were incorporated into research undertaken by several municipalities and counties within the state to estimate their energy efficiency potentials and develop energy efficiency and greenhouse gas reduction plans.

An Energy Savings Goals Study was undertaken by the CPUC in 2008. The Goals Study used the findings from the 2008 Potential Study, estimates of additional savings attributable to state building standards and federal appliance standards, savings from AB 1109 (Huffman Bill mandating improvements in general service lighting), and potential savings associated with Big Bold Energy Efficiency Initiatives to estimate energy savings scenarios. The energy savings scenarios from the 2008 Goals Study were incorporated in the development of the TMG savings goals established by the Commission.

The undertaking of a new Potential and Goals Study will update the information available to the IOUs, the CEC and the CPUC. A new Potential Study will incorporate new technologies that were not incorporated into previous studies, allow for updates to the forecasts of avoided costs and utility rates, incorporate new DEER values for savings and incremental costs, use new forecasts of housing starts and building square footage growth, and incorporate new federal appliance codes and state building standards. The Potential Study will include the development of scenario forecasts to determine the sensitivity of the energy savings potential to alternative forecasts associated with many of the input variables.

A new Goals Study would incorporate the findings from the Potential Study, savings estimates associated with reach codes and improvements in code compliance, and leverage information from Market Characterization studies of zero net energy new construction programs in order to develop revised forecasts of potential TMG savings in each IOU service territory.

### *9.1.3 General Approach, Issues, Studies/Activities*

The Commission is currently seeking comments from interested parties on two alternative options for the development of potential estimates and savings goals.[1] The options under consideration include Option A which would include a cursory review and analysis of existing potential estimates and savings goals to assist the Commission to develop new goals for the new portfolio cycle. Alternatively, Option B would extend the current cycle through 2013 and incorporate a more comprehensive review and analysis of existing potential and savings goals.

- ***Option A Approach for Potential and Goals Study***. The positive attributes of Option A are that it is quick, consistent with the schedule put forth in D 08-07-047 and would provide stability in the portfolio planning cycle. The negative attributes of Option A are that the schedule is very aggressive and does not provide the IOUs with sufficient time to develop new and improved programs and delivery mechanisms, it may not lead to maximum energy savings forecasts or budgets, and it may lead to missed opportunities.
- ***Option B Approach for Potential and Goals Study***. Option B will allow for a more accurate and representative forecast of energy efficiency savings using the most up to date data that is available to update the potential forecasts and the savings goals. Option B will provide the IOUs with sufficient time to develop new and improved program designs that accelerate progress toward meeting the goals of the Strategic Plan and provide the utilities will greater time to assess the performance of pilot programs undertaken during the 2010-2012 program cycle. The negative attributes of Option B include that the timeframe to update to the potential study is still limited. The limited timeframe may require modifications to the potential study methodology. In addition, extending the program cycle to 2013 could lead to the continuation of programs that are perceived to be performing poorly.

Whether Option A or Option B is chosen, new updates to the potential forecasts and the savings goals will be developed. If a comprehensive potential study is undertaken (Option B), the study will incorporate information from the new DEER study and the most recent update to the avoided costs forecasts. A comprehensive potential study would mine the 2010 Residential Appliance Saturation Survey for new inputs associated with measure saturations and fuel shares. Program accomplishments from the residential 2006-2008 program cycle and the 2009 programs would be used to update the 2005 California Lighting Appliance Saturation Survey residential efficiency share data. Commercial program accomplishments from the same time period will be used to update the commercial efficiency share information from the 2006 Commercial End Use Survey.

[1] See Nov. 17, 2010, Assigned Commissioner's Ruling soliciting comments on the Energy Division White Paper, and recommendations regarding the schedule for the Commission's establishment of post-2012 energy efficiency saving goals and other portfolio planning matters.

Beyond the basic revisions to potential study inputs and forecasts outlined above, a comprehensive update to both potential savings forecasts for IOU programs and TMG savings goals will also require the following individual studies in order to explicitly address the critical uncertainties embedded in current potential forecasts and incorporate the key elements of the Long-Term Strategic Plan. These individual studies could be conducted as stand-alone studies or incorporated into the scope of the Potential Study and Goals Study.

***New Construction.*** Potential savings estimates for residential and commercial new construction program will be updated to incorporate revised outlooks for IOU-administered new construction programs and their interactions with zero net energy (ZNE) new construction initiatives. New construction potential forecasts can either be developed in association with the forecasts for existing homes and floor stocks or may be developed in parallel using additional consulting resources and a modified methodology. The savings potential from the residential and commercial new construction sectors will be incorporated into both the Potential Study and the Goals Study.

A residential new construction potential study would incorporate the Single Family New Construction Baseline Study undertaken as part of the 2006-2008 Residential New Construction program evaluation. Incorporating this data would improve the accuracy of the residential new construction potential forecast.[2] Data from a Market Characterization Study of ZNE homes would also add to the accuracy and comprehensiveness of a new construction potential study. It is likely that the data collection timeline for the ZNE Market Characterization Study is inconsistent with the timeline set forth for Option B. The ZNE market data will need to be incorporated into a supplemental forecast to be undertaken either later in the program cycle or in the following program cycle.

The commercial new construction potential study will need to determine the existence of secondary data sources which could be used to update the data employed in the 2006 and 2008 Potential Studies. These studies relied on Nonresidential New Construction (NRNC) database which was derived from on-site surveys conducted during evaluations studies undertaken from 1994-2003. If this database has not been updated, alternative secondary data sources will have to be located, the NRNC database will need to be updated, or savings could be based solely on existing Title 24 code. Data from a Market Characterization Study of ZNE buildings will need to be incorporated into a supplemental forecast that will need to be undertaken either later in this program cycle or in the following program cycle.

[2] The 2006-2008 Residential New Construction Baseline Study focused solely on single family homes. Currently the majority of residential new construction is in multifamily homes. Currently there are no plans to undertake a multifamily residential new construction baseline study. The lack of multifamily baseline data will impact the accuracy of the residential new construction forecast.

***Title 24 and Title 20 "Reach" Compliance Study***. A Title 24 and Title 20 Compliance Study will be undertaken to determine quantitative estimates of code compliance levels across all measures currently covered under Title 24 and Title 20, provide forecasts of compliance levels for future "reach" codes and standards, and estimate the potential impacts of code compliance and enforcement programs. Information from this study will be incorporated, through scenario analysis, into the Potential Study and the Goals Study.

***Customer Adoption Behavior.*** The Potential Study and Goals Study activity area will also undertake a study of customer adoption behavior. Potential models are based on functions that simulate customer adoption of energy efficiency measures in response to utility program rebates and financial incentives. Existing models incorporate recent adoption data in order to calibrate adoption forecasts. However, the fundamental adoption functions and relationships are mostly derived from a limited set of adoption behavior studies that have not recently been updated to reflect current the customer behavior of California.

Updating the adoption function will help to ensure that the potential study and the savings goals reflect the most accurate and recent data available. The study of customer adoption behavior will use both existing secondary data sources and primary data collection to better characterize the influence of rebates, payback, and first cost on customer adoption behavior. In addition, this study area should closely interact with ongoing studies of customer Awareness, Knowledge, Acceptance, and Behavior and the Residential and Commercial Market Share Tracking Studies to ensure that all synergies and efficiencies are exploited. Possible primary data collect methodologies include stated and revealed preference studies.

While it may be possible to implement a Customer Behavior Study in parallel with the Potential and Goals Study, it is unlikely that the new data from this study will be incorporated into the potential or goals forecast for 2011. The Customer and Behavior Study will provide important information that can be used by program planners for the development of their program plans for the next program cycle and the information will help to improve the accuracy of future potential forecasts.

***Agricultural Potential Study***. The savings goals will incorporate the energy efficiency savings from the agricultural sector. The agricultural savings incorporated into the goals study will be derived from the Agricultural Market Characterization and Potential Study. This study will help to address existing information gaps with respect to efficiency opportunities, costs, and challenges in the agricultural sector.

***Plug Load Study***. A plug-load market characterization and potential study will be developed as a stand-alone study or partially integrated into the residential on-site saturation study. The savings goals will incorporate the energy efficiency savings from plug loads assuming the plug load study is completed in time for the 2011 Goals Study.

***ZNE Potential, Costs, and Goals Study***. This study will build off and leverage the ZNE market characterization study being conducted as part of the Market Structure and Decision making EM&V activity area in order to develop quantitative estimates of the costs, savings, and feasibility of ZNE homes and buildings in each IOU service territory. It will be conducted in conjunction with the overall potential and goals studies.

***Strategic Plan Feasibility and Cost Effectiveness Study***. This study will build off and leverage the results of the individual studies listed above and the overall potential and goals studies to assess the cost-effectiveness and feasibility of the specific elements included in the Strategic Plan. The study will be undertaken using a scenario approach to determine the influence of alternative input values for incentives, rates, and avoided costs in determining the cost-effectiveness and market feasibility of the strategic plan objectives.

### *9.1.4 Budget*

Table 9-1 lists the proposed budget for a Potential Study undertaken under Option B, a Goals Study, and all additional studies proposed to support the current and future potential and goals studies.

**Table 9-1: Potential and Goals Studies - Budget**

| Study | Budget |
|---|---|
| Potential Study: Option B | $1,500,000 |
| New Construction Potential Study | $250,000 |
| Customer Adoption Behavior Study | $500,000 |
| Agricultural Market Characterization and Potential Study | $400,000 |
| Plug Load Potential Study | $350,000 |
| Zero Net Energy Potential, Costs and Goals Study | $250,000 |
| Title 24/20 and Reach Codes Compliance | $250,000 |
| Strategic Plan Feasibility and Cost Effectiveness | $250,000 |
| Goals Study | $500,000 |

### *9.1.5 Timeline*

Table 9-2 lists the proposed timelines for studies included in the Potential and Goals Study group.

**Table 9-2: Potential and Goals Studies - Proposed Timeline**

| Activity | 2011 | | | | 2012 | | | |
|---|---|---|---|---|---|---|---|---|
| | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 |
| Potential Study | X | X | X | X | | | | |
| New Construction Potential Study | X | X | X | X | | | | |
| Customer Adoption Behavior Study | X | X | X | X | | | | |
| Agricultural market Characterization and Potential Study | X | X | X | X | | | | |
| Plug Load Potential Study | X | X | X | X | | | | |
| Zero Net Energy Potential Costs and Goals Study | | | X | X | X | X | X | X |
| Title 24/20 and Reach Codes Compliance | X | X | X | X | | | | |
| Strategic Plan Feasibility and Cost Effectiveness | X | X | X | X | | | | |
| Goals Study | | | X | X | X | X | | |
| Integrated Analysis and Report/ Documentation | | | | | | X | X | X |

## 9.2 Support Strategic Planning and Policy

### *9.2.1 Summary of EM&V Activity/Study Area*

This activity area will provide support to the CPUC's Strategic Planning process, as well as support to the overall energy efficiency policy making process. This category of analysis will inform ongoing strategic planning goals and objectives by providing funding for evaluation efforts that may not currently or fully anticipated but will be critical to maintaining continuous forward progress toward meeting these stated goals and objectives. It will include development of the next Strategic Plan, related ED consultant support, and targeted studies needed to support the Plan and inform policy making. The latter studies will be those that are not otherwise being conducted in other EM&V activity areas. Areas of direct overlap, particularly those associated with direct evaluation of program impacts and effectiveness, as well as estimation of measure/system impacts and costs, will be conducted in the activity areas responsible for those topics.

### *9.2.2 General Approach, Issues, Studies/Activities*

***Information and Services to Support Update to CPUC EE Strategic Plan***

Updating the Strategic Plan includes the provision of multiple workshops to further develop action plans for the various elements of the Plan with expert consultants, stakeholders and practitioners. This also includes review of milestones, literature review, in addition to the

workshops that will help define the timelines for action plans and supporting the "Champions" process.

*Review and Refine Cost-Effectiveness Methods and Inputs*

This study area will consider:

- Review and assessment of cost-effectiveness metrics and methods.
- Review and assessment of non-energy benefits inputs into cost-effectiveness metrics.
- Review and assessment of environmental adder inputs into cost-effectiveness metrics.
- Review and assessment of avoided cost inputs into cost-effectiveness metrics.
- Review and assessment of EUL inputs into cost-effectiveness metrics.

*Other Strategic Plan Support*

This activity would fund any additional studies that may be necessary to support the Strategic Plan and policy objectives that are not currently covered in the other parts of the EM&V plan. These could include additional study elements that can be added to studies in other plans or it could include unique studies that are identified in the workshop process or action plan development identified above.

### *9.2.3 Budget*

- Information and Services to Support Update to CPUC EE Strategic Plan, $2,000,000
- Review and Refine Cost-Effectiveness Methods and Inputs, $500,000
- Other Strategic Plan Support, $2,100,000

# 10

# Accelerated Start-Up and Funding Procedures

This section discusses and provides guidance on criteria and procedures for accelerated initiation of EM&V projects or related start-up activities (e.g., development of research plans, feasibility studies, limited research to inform decisions on larger EM&V activities, etc.) that are significant enough to require an approved work order. There was an immediate need for these criteria and procedures in 2010 due to the importance placed by the CPUC on supporting early EM&V activities for the 2010-2012 portfolio and the fact that a number of requests to initiate EM&V activities, prior to completion of this 2010-2012 EM&V Plan had been made. While these criteria and procedures were particularly needed for fall and winter 2010, they may continue to be of use throughout the EM&V cycle to facilitate review and decision making on future EM&V funding requests associated with activities otherwise unanticipated in the formal plans.

These criteria and procedures were applicable to all requests for approval to use EM&V funds prior to completion of the formal EM&V plan, regardless of whether these requests were initiated by Energy Division staff, utility staff, or ED/IOU consultants. Note that there are separate procedures which govern the process for CPUC approval of IOU EM&V projects and contractors more generally, regardless of whether they are accelerated requests or part of the EM&V plan, which follow the requirements of the CPUC's 2010-2012 EM&V Decision (D.10-04-029).

## 10.1 Accelerated Start-Up Screening, Approval, and Allocation Criteria

The following criteria will be used to determine whether to approve proposed EM&V projects, or portions of proposed EM&V projects, on an expedited basis.

1. The proposed work must fit within one or more of the high-level activity categories that support the EM&V goals.

2. The proposed work is highly likely to have been approved had it gone through the full EM&V planning process.

3. The proposed work must be likely to produce useful results.

4. It must be shown that critical information is likely to be lost, or that a critical deadline for completion is likely to be missed, if the proposed work is not fast tracked.

5. The proposed expenditures must be roughly in line with the allocation that the activity would be likely to receive if not fast-tracked. Since, by definition, fast-track requests must be decided before this allocation would be determined by the full planning process, the proposed budget as a percent of the total funding allocated to the applicable category(ies) should be generally in line with the magnitude of affected savings as a percent of all portfolio savings, with adjustments for the qualitative or overriding allocation criteria. An example of overriding allocation criteria is a study scope mandated by the Commission.

6. The proposal should reflect an effort to request staged/start-up funding rather than full funding. Requests for staged/start-up funding will be preferred over full project funding requests if such requests are large.

7. The proposed work must not duplicate or make other expected or planned work more difficult.

8. The proposed work must be appropriately structured and managed.

The fast track project proponents should address these criteria in their written work order proposal.

## 10.2 Accelerated Startup Approval and Funding Request Procedures

Approval of fast track EM&V projects or otherwise expedited start-up activities will be made by Energy Division following the same procedures used to develop, review and approve work orders documented in Energy Division's Energy Efficiency Evaluation, Measurement, and Verification Administration Guide. The procedure steps are summarized below:

- Formulate activities.
- Discuss project with an ED Contract Manager.
- Submit a work order proposal to The EM&V Management Team.
- If proposal is approved, prepare a formal work order

The EM&V Management Team, composed of ED management and senior staff, may choose to seek consultation with any of the prime contractors or consultants during this process. If the project is approved, then the project will be tracked and fed back into the more detailed EM&V planning process so that it is clear that resources are being held. As noted above, approved

funding must by definition count against the general funding allocation for the EM&V activity area(s) to which the project is assigned.

ED has encouraged the IOUs to seek approval from Energy Division for EM&V projects they believe require accelerated start-up and approval. While this EM&V work plan was prepared by the ED prime contractors, ED and the prime contractors have taken steps to include the IOUs early on in the EM&V planning process as part of the Commission's desire to establish a more collaborative process for EM&V. The IOUs were also asked to provide an early review of, and agree to be collaborators on, this work plan. Consequently, the IOUs may have deferred the implementation of some projects that do not require accelerated start-up so that these projects can be implemented within the context of the framework and procedures laid out in this work plan.

# 11

# Process for Ongoing EM&V Planning and Management

## 11.1 Process for Periodically Updating EM&V Plans and Budgets

As stated throughout this document, this work plan is not intended to be static. While the budgets and projects documented in this work plan will be earnestly used as management tools and are expected to be implemented as planned, ED and the IOUs will retain the flexibility to shift funds and refine projects when needed, as granted by the Commission in Decision 10-04-029.

However, as a courtesy to all stakeholders, ED, the IOUs and their contractors will keep a detailed record of all fund-shifting and project refinements and will summarize revisions to the high level and project level budgets and planned projects on a quarterly basis. Rather than provide a re-write of this entire work plan each quarter; ED, the IOUs and their contractors will provide updates to the underlying spreadsheets accompanied by narrative addenda that will summarize the basis for the changes relative to this work plan, describe changes to projects scopes, and identify terminated projects and new project not originally included in this work plan. These documents will be posted on the Energy Division's energy efficiency contract public document website (http://www.energydataweb.com/cpuc/default.aspx) and will be presented at the quarterly stakeholder meetings described in Section 11.4.

## 11.2 Process for Commission Oversight of IOU EM&V Projects

The following text is a partial restatement of a document provided to IOU EM&V staff by ED in August 2010. Some detail not deemed relevant to this work plan has been removed. The purpose of the original document was to lay out ED's procedures for implementing the Commission's oversight of IOU EM&V projects per Ordering Paragraph 4 and Attachment 2 of D.10-04-029.

Ordering Paragraph 4 of Decision 10-04-029 states the following:

> *"The process for Evaluation, Measurement and Verification for the 2010 through 2012 energy efficiency portfolios adopted in Decision 09-09-047 for Southern California*

*Edison Company, Southern California Gas Company, San Diego Gas & Electric Company, and Pacific Gas and Electric Company (collectively, IOUs) shall supersede the process adopted in Decision 05-01-055 regarding the following processes:*

- *An IOU shall seek approval from Energy Division before initiating Evaluation, Measurement & Verification (EM&V) ex-ante studies, or EM&V process or formative evaluations. The IOU management role for developing ex-ante savings estimates or EM&V process or formative evaluations shall be under the oversight of Energy Division, who shall have the authority to deny approval of projects. This authority is limited to situations where there is a conflict of interest with a contractor the IOU wishes to hire, where there is duplication or significant overlap with studies already planned or carried out by Energy Division, or where Energy Division can specify why a study is unnecessary. Energy Division's approval process for IOU's ex-ante studies, or EM&V process or formative evaluations, is limited to no more than two weeks. Any Energy Division denial of approval shall be in writing to the IOU requesting approval.*
- *If Energy Division expects to take three months or more to complete an ex ante estimate study, Energy Division shall approve an IOU request to develop ex-ante estimate in order to ensure timely information, or reject the request by providing the IOU, within two weeks of the IOU's request, with a written statement indicating that such rejection is due to duplication, conflict of interest or other specific rationale.*
- *Review of completed IOU workpapers regarding ex-ante savings estimates are subject to Energy Division review and approval, as set forth in an Administrative Law Judge Ruling of November 18, 2009 in Application 08-07-021, et al. Each IOU shall cooperate with Energy Division to allow upfront consultation regarding such workpapers.*
- *Energy Division's role for approval and involvement in IOU EM&V projects shall be as set forth in Attachment 2 of this decision.*
- *Energy Division may make case-by-case exceptions to the Commission-adopted firewall policy regarding program implementers in order to collect data needed for EM&V."*

In order to efficiently implement Ordering Paragraph 4, Energy Division has asked each utility to maintain a point person to be responsible for the following:

- Ensuring that all IOU EM&V projects are initiated and implemented according to the process described in this section.
- Working with ED staff and their contractors to answer questions related to the IOU EM&V projects.

- Assisting ED staff with maintaining efficient coordination between IOU and ED EM&V projects.

Implementation of the seven-step process outlined in Attachment 2 of D. 10-04-029 is clarified below. The numbered and italicized bullets are the steps from Attachment 2.

1. *Project Formation: IOUs notify ED of their intention to conduct an EM&V project and solicit input from ED on the shaping of the project. ED may choose to waive this opportunity to participate if it chooses. The point of this step is to minimize potential delays in the following steps.*
   - Projects should be notified to ED through the project management system (basecamp), maintained at https://energydivision.basecamphq.com/. This system will be used by ED to track IOU projects until further notice.
   - All EM&V projects that are planned or underway should be logged into basecamp for tracking purposes. This is required even under the following conditions:
     - If there is a possibility that a planned project will be cancelled or significantly modified.
     - Regardless of size and scope of the EM&V project.
     - Regardless of the source of funding for the EM&V project.
     - If the project has already been started.
     - If the project has already been approved by an ED staff person.
   - Hereafter, EM&V projects should be logged into basecamp prior to seeking official approval from Energy Division staff.
     - The IOUs may skip step 1 if the project is included in ED's EM&V work plan and is the proposed project is not significantly modified from the project envisioned by the EM&V work plan.
     - As each IOU EM&V project is logged into basecamp it will be assigned to an ED staff analyst. If needed, the assigned ED staff will follow-up with the EM&V project contact person for clarification.
2. *Project Description: Once the need for a project has been determined, the IOUs will prepare a project description (basically a high level scope of work, following reporting standards to be developed).*
   - When the IOU is ready to seek approval from ED for an EM&V project it will do so by uploading to basecamp a detailed project description following the format and standards specified by ED.
3. *Project Tracking: The project description will be uploaded to the Energy Division's project tracking system.*

- This step is subsumed under step 1 above

4. *Project Review and Approval: the project description will be available for review and approval by Energy Division for one calendar week.*
   - *ED will prioritize its review of projects and will reserve its review for projects of high importance (such as evaluations of strategic plan programs, "Big Bold Energy Efficiency Strategy" programs, and programs/measures with high forecasted savings) or projects that are clearly good candidates for coordination between IOUs and ED.*
   - *Within two weeks, ED will notify the IOUs if they intend hold the project to conduct a more detailed review and/or if ED requires more information on the project from the IOUs before approval can proceed. ED will provide the IOU with a letter of contractor rejection stating the specific conflict problem behind rejection of a proposed contractor, and provide an opportunity for discussion or conflict resolution before a final contractor decision is made. The IOU shall have two weeks from the date of receiving the letter of contractor rejection to discuss the issue, or file a "Motion for EM&V dispute resolution" or request for ADR. Otherwise, ED may finalize the selection of contractor.*
   - *If two weeks pass and ED has not already indicated that the project is approved or ED has not already held the project for further review, then the project will be considered approved and Energy Division's opportunity to review the project will be considered waived.*
   - When a project is formally submitted for review and approval by ED via basecamp, the assigned ED staff person will review the submitted material to determine if it meets the expected standards for project approval cited under step 2 above.
   - If these standards are not met, the assigned ED staff person will notify the IOU staff person submitting the project approval request and may request clarification or additional information within the two week review period.
   - If the standards are met, the assigned ED staff will review the documentation and will either approve or deny the project.
   - If the project is denied, ED will respond in writing.
   - If the assigned ED staff determines that the EM&V project should be publically vetted, he/she will inform the IOU and the IOU will upload all pertinent project documentation, as directed by the assigned ED staff, to ED's EM&V public document website located at www.energydataweb.com/cpuc.
   - Regardless of whether ED requires public vetting of the IOU EM&V project, the final, ED approved scope of work will be posted to the public document website.

5. *Project Initiation: Once the ED review and approval is completed (or waived) the IOUs may begin implementing the project in accordance with the project description.*
   - If the assigned ED staff provides no comment, questions, denial or approval within two weeks, then the EM&V project will be considered approved by default.
6. *Project RFP and Proposals: If the project requires competitive bidding, the IOUs will upload the RFP to the Energy Division project tracking system. If the project involves consultant proposals, the proposals will be uploaded to the Energy Division project tracking system.*
   - These documents may be uploaded to basecamp at the time that the IOU requests formal approval or the IOU can wait until receiving approval before drafting and uploading these documents.
7. *RFPs must be uploaded before they are issued, and proposals must be uploaded when they are received. Proposals will be subject to review by ED staff and their advisory consultants. Proposals will not be reviewed by KEMA or Itron staff. Proposals that contain proprietary and/or confidential information will be treated with the appropriate level of confidentiality. Contractor Selection: If the project involves hiring a contractor, whether by competitive or directed bid, the IOUs will notify ED of their preferred contractor and other contractors who were considered and/or who submitted bids. ED will make the final selection of all EM&V contractors.*
   - ED will notify the IOU if the preferred contractor is accepted or if ED intends to select a different contractor.

## 11.3 Process for Energy Division and IOU Collaboration

In Decision 10-04-029, the Commission adopted policies with the intent of establishing a more collaborative rather than adversarial relationship between the IOU and ED staff. Specifically, Decision 10-04-029 adopted the following policies that are pertinent to the process for ED and IOU collaboration:

- Requires ED and IOU staff to conduct EM&V projects in a transparent manner, including: open, truthful, and timely communication, regular meetings to provide updates on projects, inclusion of ED and IOUs in all stages of all projects, sharing of data as it becomes available, and tracking of all projects in an easily accessible tracking system.
- Requires ED and IOUs to attempt to resolve disagreements informally before seeking formal dispute resolution.
- Requires ED and IOUs to design EM&V projects to be streamlined, to comply with Commission mandated schedules, and to avoid duplication of effort.

- Requires ED and IOUs to follow professional standards for ethics and technical best practices.
- Grants ED and IOUs flexibility to plan and implement EM&V in phases while continuously optimizing the EM&V portfolio and emphasizing the flow of EM&V results to program managers for program improvements.
- Requires avoiding unnecessarily duplicative data collection and analysis and identifying ways in which EM&V can be organized and implemented to meet multiple needs in a cost-effective manner.
- Affirmation of ED's authority to review, approve and oversee IOU EM&V activities.
- Clarification that ED may conduct some formative evaluations within their portfolio of EM&V projects.
- A requirement that IOUs collaborate with ED in the development of non-DEER savings workpapers.
- A stakeholder input process that supersedes the process adopted in D.05-01-055.
- Delegation to ED to determine which projects should be subject to the stakeholder input process.
- A dispute resolution process that involves mediation by the ALJ Division.
- A requirement that all EM&V-related projects, regardless of funding source, adhere to the same policies and procedures as EM&V funded projects.
- Allows ED to use program implementers as a vehicle for collecting EM&V data.

In order to establish an administrative framework for effective collaboration between the IOU and ED EM&V staff and ensure the greatest chance of realizing these Commission policy goals, ED has drafted the following administrative procedures, which are intended to supplement the Commission's EM&V policy goals with essential implementation detail.

### *11.3.1 Monthly ED/IOU EM&V Management and Coordination Meetings*

ED and the IOU EM&V staffs will meet during regular monthly meetings to coordinate the overall EM&V effort. These meetings will be a forum to discuss planned and upcoming EM&V projects; distribute management responsibility for EM&V projects between ED and IOU staff; coordinate cross-project field work and surveys; and exchange information, ideas, project plans and findings. This meeting will not be the place and time for making routine project-level planning decisions, unless such decision have been elevated for resolution to the meeting by an ED or IOU project manager.

- The meeting will be held on the second Tuesday of every month from 10 AM – 2 PM, starting Dec. 14. The meeting can be extended to 5 PM, as needed.

- The meeting will be held in the San Francisco area, with occasional events in Southern California.
- The meeting will be attended by ED and IOU EM&V staff.
  - ED may invite selected EM&V contractors to attend, as the topics dictate.
  - ED may request attendance by other IOU staff, as the topics dictate.
  - IOU EM&V staff may invite other IOU staff or their contractors, as the topics dictate.
- At the end of each meeting, the attendees will select a facilitator for the next month's meeting (from among the ED, IOUs, or invited EM&V contractors who are expected to attend the next month's meeting). The facilitator for the next month will be responsible for:
  - Gathering input from IOUs and ED and drafting an agenda.
  - Confirming meeting location, facilities, A/V equipment, conference line, and web meeting.
  - Facilitating the meeting and appointing a note-taker.

### *11.3.2 Process for Determining Project Level Management Responsibility (between ED and the IOUs)*

- A standing agenda item for each monthly EM&V Management and Coordination meeting will be a review of upcoming EM&V projects.
  - Prior to the monthly meeting, ED and IOUs will share information regarding their respectively planned projects at the project formation stage.
    - IOUs will post information regarding planned projects on basecamp at least one week before the meeting.
    - ED will provide information regarding planned projects within the EM&V Work Plan and updates to the EM&V Work Plan.
  - During the meeting, IOUs and ED will each summarize their respectively planned projects, answer questions, and identify projects where there is significant common interest and opportunities to coordinate. If both ED and the IOUs express a legitimate interest in and /or have a need to participate in a project, it will be considered a project of common interest.
- For projects where there is significant common interest and opportunities to coordinate, ED and the IOUs will discuss the project management structure that has the highest likelihood of accomplishing both organizations' objectives:
  - Whether a project should be managed by an IOU staff person or an ED staff person.
  - Who that project manager should be.

  - Who should be a regular participant in Project Coordination Groups (see Section 11.3.3 below).
  - If necessary, how to procure the most appropriate contractor assistance.
- ED and the IOUs will attempt to establish consensus on the project management structure for each project where there is significant common interest and opportunities to coordinate. If consensus cannot be reached, ED will select the project management structure that ED believes will work best.
- If the decision is made to have an IOU staff person manage the project, the IOU manager may propose a specific individual to manage the project.
- If the decision is made to have ED manage the project, the original IOU project will be considered not approved because of duplication or significant overlap with studies already planned or carried out by ED.
- If the IOUs believe ED is in error in making this decision, they may pursue resolution by filing a Dispute Resolution Motion pursuant to Ordering Paragraph 7 of D.10-040-029.
- If contractors are involved in an IOU managed project, the IOUs would need to hold the contract with the contractors.

### *11.3.3 EM&V Project Coordination Groups*

- Once the project management responsibility is determined for a project of mutual interest and the project is initiated, the project manager will ensure that the ED and IOU staff identified by their respective management to be regular participants in project management meetings (Project Coordination Groups) are:
  - Invited to the project initiation meeting(s).
  - Provided with all project documentation throughout the course of the project, provided that the documentation is not considered part of a CPUC deliberative process by ED management.
  - Invited to regular project management meetings that are not considered part of a CPUC deliberative process by ED management.
- The project manager will have the discretion to make project management decisions without the participation of the full Project Coordination Group under the following circumstances:
  - The Project Coordination Group members cannot be available to attend a project coordination meeting or provide input to the project manager within a timeframe deemed necessary by the project manager.
  - The decision is considered routine and inconsequential by the project manager.

  - There are overriding considerations that would render input from the Project Coordination Group moot (such as a specific Commission or ED management directive).
- The project manager notifies the full Group of the decision(s) at the next Project Coordination Group meeting.

## 11.4 Process for Stakeholder Input

In Decision 10-04-029 the Commission adopted a stakeholder input and review process to replace processes previously adopted in Decision 05-01-055. This process is summarized below with additional procedural context and implementation detail not included in the original commission order, taking into account the Commission's delegation of responsibility for weighing the value of public input versus the extra time such input would entail to ED, and with the addition of the Commission adopted dispute resolution process.

### *11.4.1 EM&V Plan*

The initial "EM&V Plan" for the 2010-2012 portfolio was developed jointly by ED and the IOUs, issued for comment via ALJ ruling on November 20, 2009 in Application 08-07-021[1], and wholly adopted by Decision 10-04-029. The EM&V Plan was a high level document that identified initial planning tasks, strategies, and potential research areas; set preliminary priorities; and submitted high-level budget allocations for stakeholder comments and Commission approval. This document takes the vital next step in the EM&V planning process by further refining budgets and priorities; cataloging EM&V research needs; and identifying the implementation detail for specific EM&V research project to be implemented during the program cycle. This document, the "EM&V work plan", will be issued for public review and comment with the following caveats:

- There is no process for Commission adoption or for "finalizing" the work plan. The work plan is a project management tool and a means to provide full disclosure of this phase of the EM&V process to all interested parties. The work plan is not intended to be static and will be updated on a periodic basis as described in Section 11.1.
- Consistent with the Commission's concern that critical EM&V projects be completed on a timely basis, ED and the IOUs will continue to initiate priority EM&V projects as this work plan is reviewed and commented on by stakeholders.

[1] http://docs.cpuc.ca.gov/published/proceedings/A0807021.htm

### *11.4.2 EM&V Work Orders*

Because ED's EM&V activities will be conducted through specific work orders, ED has set up a procedure for review of and comment on those work orders and the underlying projects. As described in Section 11.2, ED will require the IOUs to post their approved EM&V project scopes on the public document website. Thus ED expects that the process for IOU projects will follow similar procedures. The procedures below are adapted from the stakeholder input process adopted by the Commission in Decision 10-04-029.

- All project scopes and work orders developed by Energy Division and the IOUs will be posted on the Energy Division public document website at www.energydataweb.com/cpuc/default.aspx. In some cases, draft work orders will be posted for public comment. Notice of posting of work orders will be sent to subscribers to the work order topic on the public document website and, when appropriate, to the applicable CPUC service list. Comments on draft work orders will be submitted to and will be publicly available on the public document website.
- Energy Division and the IOUs may hold public meetings (in person, via webinar, or via webcast), separately or jointly as the case may be, to solicit input on certain draft work orders posted on the public document website. Parties may submit written comments on these work plans before and/or after the public meetings; these comments will be posted on the public document website. Notice of the public meetings will be sent to subscribers on the public document website and to the applicable service list. Energy Division and the IOUs, working with their respective EM&V contractors, will finalize the draft work orders, taking into consideration the parties' written comments and input during the public meetings.
- The finalized work orders will be posted on the public document website.
- If a party or parties take(s) issue with a final work orders, the party or parties may file a motion with the Assigned ALJ and provide evidence for why the work order should be changed and how. The ALJ will resolve the dispute and direct Energy Division and/or the IOUs to revise the plans accordingly via ruling.[2]

### *11.4.3 EM&V Project Implementation and On-going Feedback*

- Energy Division and the IOUs will convene a monthly meeting among their staff and EM&V contractors to share key results and EM&V findings that might lead to improvements in the portfolio and identify best practices and possible improvements to

[2] Decision 10-04-029 describes the dispute resolution process: "For Project-Specific EM&V Plans, if parties continue to take issue with the final work plans, a party or parties may file a motion with the assigned ALJ and provide a rationale for why the plans should be changed and how. The ALJ will resolve the dispute and direct ED and/or the IOUs to revise the plans accordingly via ruling." http://docs.cpuc.ca.gov/word_pdf/FINAL_DECISION/116710.pdf.

evaluation methods. The meetings will generally be held in San Francisco, although they may be held in Southern California as the occasion warrants. The meetings will take place on the second Tuesday of the month, from 10:00 a.m. to 2:00 p.m., starting in December 2010.

- The meetings will be open to the public on a quarterly basis. The first public meeting will take place on the first Tuesday of March 2011 (March 8, 2011). The agenda will be posted on ED's public documents website and notice will be sent to subscribers to the topic within the public document website and the relevant CPUC proceeding service lists.
- Informal public meetings to discuss EM&V work progress and results may be held by ED, the IOUs or both on an ad hoc basis if requested by ED, the IOUs, parties or members of the public.
- When significant results are produced by the EM&V work, and a technical report is not immediately pending, the Energy Division and/or the IOUs will provide informal written summaries of the results to all stakeholders. These written summaries will be posted on the public document website.

### *11.4.4 EM&V Technical Reports*

- Drafts[3] of any interim or final EM&V technical reports produced by Energy Division, the IOUs, and their respective contractors will be posted on the public document website. A notice will be distributed to the appropriate service list(s) and to subscribers to the pertinent topic in the public document website. For this purpose, EM&V technical reports are defined as reports produced by the Energy Division, IOUs, and their respective contractors that document completed analysis and are identified as a milestone in the Evaluation Plan or in a work order.
- Energy Division and the IOUs will hold public meetings (in person, via webinar, or via webcast), separately or jointly as the case may be, to solicit input on the EM&V Technical Reports. Parties may submit written comments on these reports before and/or after the public meetings. Comments must be submitted to the public document website and will be publicly available. Energy Division will also review and reserves the right to provide written comments to the IOUs on their EM&V contractors' draft reports.
- Energy Division and the IOUs, working with their respective EM&V contractors, will finalize the draft reports, taking into consideration the parties' written comments and/or input during the public meetings.

[3] "Draft" in this context refers to a completed version of a technical report that is deemed ready for public posting by the project manager. In this case, a "draft" report is final in every sense except for the final step of allowing for stakeholder review, gathering stakeholder comments and making changes in response to stakeholder comments.

- The final EM&V technical reports will be posted on the public document website. Responses to written comments on the draft reports will be prepared and posted at the same time or soon after the revised reports are posted. Notice of posting of final technical reports will be sent to subscribers to the relevant topics on the public document website and to the appropriate service list.
- If parties continue to take issue with the final EM&V technical reports, a party or parties may file a motion with the Assigned ALJ and provide evidence for why the report is deficient and what changes to the report would be necessary to correct the deficiency. The ALJ will resolve the dispute and direct Energy Division and/or the IOUs, via ruling, to prepare an addendum to the report correcting the deficiency. The addendum will be posted on the same website where the draft reports are posted.
- Within 60 days of public release, the program administrators will respond in writing to the final report findings and recommendations indicating what action, if any, will be taken as a result of study findings. The IOU responses will be posted on the public document website.

### *11.4.5 Aggregate EM&V Reports*

- Energy Division's draft reports aggregating or summarizing the results of the EM&V technical reports, in any form, will be issued via ALJ Ruling for parties' comments and posted on the public document website. (These aggregate reports will include the current Annual Verification Reports and Interim & Final Performance Basis Reports, or the equivalent, as adopted by the Commission.)
- Energy Division will hold public meetings (in person, via webinar, or via webcast), to discuss the draft report. Parties may file comments and reply comments on the draft aggregate EM&V report for a specified period following the public meetings. The comments must be posted on the public document website.
- The assigned ALJ will issue a proposed decision on the draft aggregate EM&V report, revising it as needed based on parties' comments.
- Parties may file comments and reply comments on the ALJ's proposed decision pursuant to Commission procedure.
- The Commission will adopt a decision on the final aggregate EM&V report.

### *11.4.6 Dispute Resolution Process*

In Decision 10-04-029, the Commission established dispute resolution methods for matters that cannot be resolved informally between ED and the IOUs. Under that process, a party may file a "Motion for EM&V Dispute Resolution" (EM&V Motion) with the assigned ALJ in R.09-11-014 or its successor for resolution of an EM&V matter. The EM&V Motion must include a

statement from ED giving its side of the dispute. The ALJ may undertake any appropriate process to gather further information. The ALJ may issue a Ruling to resolve the dispute.

Alternatively, in an EM&V Motion, the filing party or the ED may ask that the matter be resolved by the assigned Commission or the full Commission. In that case, the ALJ will consult with the assigned Commissioner to determine the appropriate course of action. This may include an ALJ Ruling, an assigned Commissioner Ruling, or a Commission Decision. If the ALJ and assigned Commission decide to bring the matter to the full Commission, the ALJ or assigned Commissioner will issue a PD and allow for comment under Rule 14 of the Commission's Rules of Practice and Procedure.

The EM&V Motion may be used for the following purposes only:

- Disputes over results of EM&V studies or reports;
- Dispute over selection of an EM&V contractor;
- Disputes about project-specific final EM&V work plans;
- Disputes regarding final EM&V technical reports; and
- Disputes concerning public vetting of EM&V projects.

The EM&V Motion process does not apply to any dispute over results of ED Verification Reports, either draft or final.

# A

## EM&V Projects and Budgets

# Table A.1 – Sorted by Study Type, Similar to Section 4

| Res/ Nonres/ CC | Pgm/ Pgm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
|---|---|---|---|---|---|---|---|---|---|
| CC | All | Measure and Program Impacts and Verification | Detailed Impact Evaluation of High Impact Measures | Detailed Impact Evaluation of High Impact Measures | 1 | This is comprised of 6-10 individual, very high quality impact evaluations that would focus on a single measure group, but provide reliable results at the program level for key programs or groups of similar programs. Measure groups that contribute a significant amount to all IOU portfolios would be strong candidates for these studies, particularly those which were not evaluated in great detail as part of the '06-08 evaluations. These studies would be developed to provide both precise (90/10) ex post savings results, but also yield useful information for current and future program planning. We would expect a budget in the range of $1 to 2m for each individual measure group study. | $10,000,000 | ED | $0 |
| CC | All | Measure and Program Impacts and Verification | Impact Evaluation of Custom Measures | Impact Evaluation of Custom Measures | 2 | There are a number of custom measure groups which contribute a significant amount of savings to the overall portfolio that will be evaluated as part of this study. The savings associated with these measures also typically have very high uncertainty because they are custom measures. These studies can be costly because they require early evaluation efforts to establish baselines (which is budgeted in a separate study listed below), M&V to develop reliable savings estimates, and net-to-gross data collection using professional staff. Please note that the indirect impact programs, such as NRA, CEI, IDSM, ETP, etc., will be classified along with the custom measure studies. We would expect a budget in the range of $250k-$1m per measure group evaluated. | $9,000,000 | ED | $0 |
| CC | All | Measure and Program Impacts and Verification | Impact Evaluation of Strategic Measures | Impact Evaluation of Strategic Measures | 3 | This is comprised of 6-10 individual impact evaluations that will focus on a single measure group. These measure groups have significant future savings potential and/or are key to strategic planning goals. These may not be measure groups that are currently providing significant levels of savings. Also included in these strategic studies could be impact evaluations focused on pilot programs offered by the IOUs, such as the OPOWER Pilot Program. These studies would be more limited in scope ($250-750k each), focused on providing results that can be reliably used for future planning. Results are not necessarily meant to be program-specific to 2010-12 programs, but may be specific to program types for future planning (i.e., direct install versus deemed savings). | $5,000,000 | ED | $0 |
| CC | All | Measure and Program Impacts and Verification | Parameter Focused and Cross-Cutting Impact Evaluations | Parameter Focused and Cross-Cutting Impact Evaluations | 4 | This is comprised of 6-10 individual impact evaluations that will be focused on measure groups that are not listed above, but comprise a significant level of savings. Measure groups in this category are likely to have been studied in the 06-08 cycle and have relatively reliable existing savings values. These studies are likely to focus on parameters (or possibly customer segments) where the greatest uncertainties lie with the existing results. Many of the indoor lighting measures might fall under this category. These studies may also include cross cutting studies that are focused on a single parameter, such as a NTG study, an EUL/RUL study or an HVAC interactive effects study. We would expect these studies to have a wide range of cost depending on how focused the measure/study is, and the measure's contribution to savings (likely in the range of $250-$1m). | $4,500,000 | ED | $0 |

| Res/ Nonres/ CC | Pgm/ Pgm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
|---|---|---|---|---|---|---|---|---|---|
| CC | All | Measure and Program Impacts and Verification | Verification and Ex Ante Review/Update Study for Moderate Impact Measures | Verification and Ex Ante Review/Update Study for Moderate Impact Measures | 5 | The objective of this study is to provide an estimate of ex post savings for a group of measures that comprise enough statewide savings, such that the cumulative savings among measures in all five impact evaluation study categories would comprise at least 80% of the kW, kWh and therm savings claim by the IOUs. At a minimum, this study would provide a combined verification rate and an ex ante review/update for all measures. If there are some "special interest" measures or measure segments, some additional resources may be allocated to those measures to oversample them. | $1,000,000 | ED | $0 |
| Nonres | All | Measure and Program Impacts and Verification | Early EM&V for Non-Residential Custom Projects - ED EM&V Funds | Early EM&V for Non-Residential Custom Projects - ED EM&V Funds | 6 | This study will capture all of the early EM&V activities associated with the Customer Measure impact evaluations. See the write-up above for the Impact Evaluation of Custom Measures. | $2,000,000 | ED | $0 |
| CC | Lighting | Measure and Program Impacts and Verification | Parameter Focused and Cross-Cutting Impact Evaluations | CFL Laboratory Testing | 7 | **CFL Lab Test (Pre 2010-2012 funded).** The CPUC and SCE have co-funded laboratory study to look at CFL lamp life as a function of usage and switching patterns. A sample of 3,600 CFLs, designed to be representative of mix of CFL products in the California market and promoted through California IOU programs, was acquired from retail outlets across the state that was. 72 models are represented in this test, 66 of which are Energy Star qualified models.<br><br>In September 2010, a two-year "cycle test" was initiated where the 3,600 CFLs were placed on 10 different timing cycles (360 identical batches in each of the 10 cycles) to look at life characteristics vs switching patterns. The 10 timing cycles ranged from as short as 2 minutes on to as long as 12 hours on. Five samples from of each of the 72 models are on each of the 10 cycles, yielding 360 CFLs per cycle.<br><br>One project objective is to combine results of the laboratory cycle test with logger data from real world applications to get better estimates of actual expected CFL life (as opposed to rated life, which is based on 3 hr cycles). The laboratory study will also be conducting a number of other measurements including lamp lumen output (which will allow for a comparison of rated lumens vs measured lumens), lumen depreciation, CRI, CCT, PF, and Mercury content.<br>Complete results are not expected until late 2012, but some preliminary findings (such as the results of the rapid cycle tests as well as rated vs measured lumen outputs) may be released earlier. | $0 | ED/SCE | $760,000 |
| Res | All | Program Delivery and Implementation Assessment | Process Evaluation | Overarching Process Evaluation of All Residential | 8 | **Overarching process evaluation of all residential programs.** The goal of this study is to provide funding for ED-managed research and analysis designed to address overarching program delivery and implementation issues, including adoption effectiveness, best practices and integration effectiveness. For the most part, | $500,000 | ED | $0 |

| Res/ Nonres/ CC | Pgm/ Pgm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
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| | | | | Programs | | these studies will draw on primary research conducted as part of IOU-led process evaluations, as well as other sources (e.g., market studies, impact studies, etc.). In addition, the scope of this study could include stand-alone research that ED conducts to fill gaps not covered by the IOU-led process evaluations. For example, particular emphasis may be given to areas of strategic interest to the CPUC, including the assessments of comparative use and other behavioral change program models, integration of emerging technologies into core residential programs and cost-effectiveness assessments of different marketing and outreach strategies. This study will produce quarterly reports in an effort to provide more timely feedback to program planners and portfolio managers. Annual reports and a final report will also be generated, documenting interim findings and actions taken by IOUs to improve programs during this cycle. The annual reports will also report on results related to PPMs, MTIs and other strategic planning goals and objectives. | | | |
| Res | All | Program Delivery and Implementation Assessment | Process Evaluation | Process Evaluation of Sempra's Residential Programs | 9 | **Overarching process evaluation of all Sempra's residential programs.** Sempra has proposed to conduct independent process evaluations of the residential retrofit programs included within the SDG&E and SCG portfolios. The primary goal of these studies is to assess the effectiveness of program design, program implementation and marketing activities. The studies will be designed to address process evaluation issues for all residential retrofit programs, including statewide, local and third party. In addition to funding its own independent process evaluations, Sempra plans to provide a limited amount of EM&V funding for process/market studies being managed by PG&E and SCE to the extent that those studies will be collecting data/reporting on baseline metrics, PPMs, MTIs, etc. | $600,000 | IOU | $0 |
| Res | ARP | Program Delivery and Implementation Assessment | Process Evaluation | ARP Early Feedback Evaluation, Process Evaluation and Market Assessment | 10 | **ARP Early Feedback Evaluation, Process Evaluation and Market Assessment.** There are three components of this study: (1) an early feedback evaluation of the ARP retailer trail component, (2) an IOU-led process evaluation of the ARP, and (3) a coordinated market assessment of the ARP and retailer trail components. ED will oversee the IOU management of each of these studies, as well as the coordination with related studies being managed by ED and/or the IOUs.<br><br>Specific goals of the early feedback evaluation include assessing whether or not the retailer trials had the desired outcomes using treatment v. control group analyses. Retailer trials are being conducted in both SCE and PG&E service territories. Feedback is needed by early 2011 in order to incorporate successful elements into the core ARP program. The budget for this component of the study includes a placeholder for ED involvement in study design and analysis of results.<br><br>In addition, the IOUs have proposed to conduct a comprehensive process evaluation of this program, along with an early feedback evaluation of the ARP "retailer trail" program component. The goals of the process evaluation include assessing the effectiveness of program design, including the adequacy of rebate levels and the effectiveness of retailer training activities. The process evaluation will also assess the effectiveness of program marketing, including program | $600,000 | IOU | $0 |

| Res/ Nonres/ CC | Pgm/ Pgm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
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| | | | | | | benefits messaging, website usability, in-store promotions, outreach to landlords and integration with other IOU and non-IOU programs (e.g., Codes & Standards, HEER, LIEE, WE&T, EPA). The process evaluation will assess program implementation and delivery effectiveness, including evaluating whether or not the program accomplished its targeted and committed outcomes as stated in the Program Implementation Plans (e.g., improved satisfaction with program delivery timelines, program tracking data reliability improvements, etc.).<br><br>In addition, a comprehensive market assessment will also be completed for this program. This assessment will be designed to collect information needed to understand end user preferences, practices, decision criteria, etc. specifically as they relate to usage and disposal patterns for secondary appliances. In addition, the assessment will be designed to understand the structure and operations of appliance disposal and resale markets. Baseline measurements of standard practices for recycling program-qualified appliances will also be researched as part of this assessment. Finally, customer segmentation and emerging technology research will also be conducted to support future program design.<br><br>Because the core ARP program, as well as the "retailer trail" component, have been specifically designed in 2010-2012 to include strategies to reduce free ridership and improve overall realization rates, it will be important that all three of these study components (e.g., early feedback evaluation, process evaluation and market assessment) are highly coordinated with the impact evaluation activities carried out for measures targeted by this program.<br><br>In addition, the PPM for this program calls for measurements of saturation levels for appliances by age, size and efficiency. As such, this study will need to coordinate with the residential saturation study. Data related to this PPM will be collected as part of the residential saturation study, while the analysis and reporting on the PPM measurements will be included in the process evaluation. Finally, overall awareness of the program will also be studied through coordinated research targeting the residential sector as a whole (e.g., general population surveys included within the AKA-B measurements study group). | | | |
| Res | BCE, HEER | Program Delivery and Implementation Assessment | Process Evaluation | Comprehensive Process Evaluation and Market Assessment of BCE and HEER Program | 11 | **Comprehensive Process Evaluation and Market Assessment of BCE and HEER Programs.** This study includes research and analysis in support of both the BCE and HEER programs. Given the synergies across these two programs (e.g., market actor participation, marketing and outreach activities, etc.), the overall research effort has been combined into one study.<br><br>A key element of this study involves a process evaluation of both programs. The process evaluation will assess the effectiveness of education and training program components, including retailer education and training initiatives and online consumer training tools designed specifically for BCE. The process evaluation will also address program design effectiveness, including adequacy of incentive levels | $750,000 | IOU | $150,000 |

| Res/ Nonres/ CC | Pgm/ Pgm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
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| | | | | | | and the use of upstream, midstream and/or downstream delivery channels. Program marketing and outreach effectiveness will also be evaluated focusing on strategies corporate retailer partnerships, in-store promotions, outreach to sales and service teams, engagement of relevant industry groups and associations, and integration with other IOU and non-IOU programs (e.g., SCE's Online Buyers Guide, ARP, MFEER, Codes & Standards, Emerging Technology, ME&O, WE&T, LIEE, EPA, CEC, "Top Ten USA"). The process evaluation will also include an assessment of program implementation and delivery effectiveness, including accomplishment of program outcomes (e.g., level of retailer participation, POS customer data collection, program responsiveness and timeliness, etc.). Finally, the process evaluation will also focus on the effectiveness of program administration and management processes, including contact management, program documentation, rebate payment and retailer invoicing, etc.<br><br>This study will also include a market assessment component. Surveys will be conducted with market actors, residential consumers as well as business-to-business consumers to address program-specific AKA-B metrics. For the BCE program in particular, this study will include market research to further understanding of the structure and operations of target markets (e.g., market size, market players, product availability, etc.). Funding has been set aside to support ED involvement in this important component of the study. Data to support the measurement of PPMs will also be collected as part of the BCE and HEER market assessment research activities.<br><br>In addition, this study will be coordinated with residential sector saturation and market share tracking studies, providing baseline measurements (i.e., sales and penetration estimates). This study will also coordinate with overarching residential sector studies to provide measurements of AKA-B metrics. Finally, this study will utilize data collected from the overarching potential study, as well as any specific studies focused on plug load potential, and provide recommendations for program improvement and future program design. | | | |
| Res | HEES+ | Program Delivery and Implementation Assessment | Process Evaluation | HEES and Related Programs Process Evaluation | 12 | **HEES and Related Programs Process Evaluation.** This study involves research to improve programs designed to provide consumers with information to help them implement energy savings measures, as well as various marketing and outreach activities designed to provide similar information to specific segments and target markets. Specifically, this study will provide process evaluation results for the statewide HEES program, including the new "universal audit tool" program components, as well as local marketing and outreach programs such as SCE's Community Language Energy Outreach (CLEO) program and the Online Buyer's Guide.<br><br>The process evaluation of this group of related programs will include an assessment of program design effectiveness, including evaluating the comprehensiveness and implementation of energy audit recommendations. The | $400,000 | IOU | $44,000 |

| Res/ Nonres/ CC | Pgm/ Pgm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
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| | | | | | | process evaluation will include an examination of program delivery and implementation effectiveness, including the accomplishment of targeted and committed outcomes. Program marketing and outreach strategies will be assessed, including multi-language outreach, targeted segment participation (e.g., high-usage), hard-to-reach segment participation, cross-program participation, and messaging and delivery options (e.g., email, flyers, direct mail). The process evaluation will address how well the information provide through these programs was integrated with others IOU and non-IOU programs (i.e., HEER, Whole House, Emerging Technology, WE&T, CSI, AMI, LIEE, EPA, water saving programs, municipal programs, etc.). Budget has been set aside for ED oversight of and involvement in the design of research for assessing integration effectiveness, adoption effectiveness and best practices.<br><br>This study will coordinate with residential sector saturation and market share tracking studies to collect data on penetration rates. AKA-B metric measurements will be collected through coordinated research targeting the residential sector as a whole. | | | |
| Res | MFEER, CMHP | Program Delivery and Implementation Assessment | Process Evaluation | Process Evaluation of MFEER and CMHP Programs | 13 | **Process Evaluation of MFEER and CMHP Programs.** This study involves the process evaluation of two separate programs, the Multi-family Energy Efficiency Rebate Program and the Comprehensive Mobile Home Program. The process evaluation of each program will focus on program design, delivery and implementation effectiveness, including the apartment audit tool, lead qualification process, maintenance staff training activities, measure and market actor diversification, quality control and participant satisfaction. In addition, the process evaluation will assess the effectiveness of program marketing, including targeted marketing efforts, marketing and outreach campaigns (e.g., telemarketing, field sales, direct mail, elevator announcements, website), and networking activities targeting various trade and industry organizations. The process evaluation will also include an assessment of integration effectiveness, including coordination with other IOU and non-IOU programs (e.g., codes & standards, WE&T, solar water heating, solar pool heaters, etc.). Finally, the process evaluation will coordinate with other studies (e.g., residential sector saturation and AKA-B measurement studies) to collect data needed to measure PPMs. | $300,000 | IOU | $0 |
| Res | Whole House | Program Delivery and Implementation Assessment | Process Evaluation | Whole House Process Evaluation and Market Assessment | 14 | **Whole House Market Assessment and Process Evaluation.** This study will include a market assessment and process evaluation for the Whole House Program. The research to be conducted as part of this study should be carried out in phases. The first phase will involve the collection of information needed to establish important baseline measurements and provide early process evaluation feedback. Subsequent phases will include more in-depth study of the program's design, marketing and implementation, as well as best practices and integration effectiveness assessments. This study will be highly coordinated with other studies, including the residential sector potential, impact evaluation and measure cost studies. | $500,000 | IOU | $0 |

| Res/ Nonres/ CC | Pgm/ Pgm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
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| Res | MIDI | Program Delivery and Implementation Assessment | Process Evaluation | Moderate Income Direct Install (MIDI) Program Process Evaluation | 15 | **Moderate Income Direct Install (MIDI) Program Process Evaluation.** This study will include a process evaluation of the MIDI Program. Similar to the research conducted for the Whole House Program, this study will be carried out in phases. The first phase will involve the collection of information needed to establish important baseline measurements and provide early process evaluation feedback. Subsequent phases will include more in-depth study of the program's design, marketing and implementation, as well as best practices and integration effectiveness assessments. This study will be highly coordinated with other studies, including the residential sector potential, impact evaluation and measure cost studies. | $200,000 | IOU | $0 |
| Res | NC | Program Delivery and Implementation Assessment | Process Evaluation | Residential New Construction Process Evaluation and Market Characterization | 16 | **Residential New Construction Market Characterization and Process Evaluation.** This study is a Market Analysis of California's residential new construction market. The study will provide comprehensive market structure and decision making analyses for the manufactured housing market, the new multi-family construction market and the new single family construction market. The study will provide for detailed reporting on key submarkets and market processes, such as HERS raters and energy consultants, building design process, program participation, and appropriate segmentation and characterization of new home buyers.<br><br>For each major sector, the study will include broadly scoped and in-depth market characterizations as well as AKA-B measurement. The studies will also investigate program best practices and program design and implementation improvements. This will include the study of incentive structures, the optimal provision of non-incentive services, as well as strategies in marketing and outreach. Marketing and outreach research will include a close look at potential applications to the SCE Integrated Marketing and Outreach Program.<br><br>The studies will further investigate baseline building practices, efficient market share and remaining energy efficiency potential in each market, with a view ultimately to constructing an actionable roadmap for the cost effective achievement of strategic plan goals.<br><br>In addition, this study will provide an update to research conducted 2007-2008 which estimated costs associated with improved efficiency in single family new construction. The update will be in accordance with the final 2008 Title24 code (not available at the time of the original study) and will revise baseline building assumptions by climate zone, as appropriate. | $350,000 | IOU | $0 |
| Nonres | All | Program Delivery and Implementation Assessment | Process Evaluation | Overarching Process Evaluation of All Nonresidential Programs | 17 | **Overarching process evaluation of all nonresidential programs.** The goal of this study is to provide funding for ED-managed research and analysis designed to address overarching program delivery and implementation issues, including adoption effectiveness, best practices and integration effectiveness. For the most part, these studies will draw on primary research conducted as part of IOU-led process evaluations, as well as other sources (e.g., market studies, impact studies, etc.). In addition, the scope of this study could include stand-alone research that | $1,500,000 | ED | $0 |

| Res/ Nonres/ CC | Pgm/ Pgm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
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| | | | | | | ED conducts to fill gaps not covered by the IOU-led process evaluations. For example, particular emphasis may be given to areas of strategic interest to the CPUC, including a study of the Onbill Financing Program, the integration of emerging technologies into core nonresidential programs, and cost-effectiveness assessments of different marketing and outreach strategies. This study will produce quarterly reports in an effort to provide more timely feedback to program planners and portfolio managers. Annual reports and a final report will also be generated, documenting interim findings and actions taken by IOUs to improve programs during this cycle. The annual reports will also report on results related to PPMs, MTIs and other strategic planning goals and objectives. These two studies are: | | | |
| Nonres | All | Program Delivery and Implementation Assessment | Process Evaluation | Process Evaluation of Sempra's Nonresidential Programs | 18 | **Overarching process evaluation of all Sempra's nonresidential programs.** Sempra has proposed to conduct independent process evaluations of the nonresidential retrofit programs included within the SDG&E and SCG portfolios. The primary goal of these studies is to assess the effectiveness of program design, program implementation and marketing activities. The studies will be designed to address process evaluation issues for all nonresidential retrofit programs, including statewide, local and third party. In addition to funding its own independent process evaluations, Sempra plans to provide a limited amount of EM&V funding for process/market studies being managed by PG&E and SCE to the extent that those studies will be collecting data/reporting on baseline metrics, PPMs, MTIs, etc. | $1,000,000 | IOU | $0 |
| Nonres | All | Program Delivery and Implementation Assessment | Process Evaluation | Process Evaluation of Nonresidential Retrofit Programs | 19 | **Process Evaluation of Nonresidential Retrofit Programs.** This study includes a comprehensive process evaluation of all nonresidential retrofit programs, including statewide, local, partnership and third party programs. The goal of the study is to assess the effectiveness of nonresidential retrofit program administration, design, implementation and marketing, with particular emphasis on adoption effectiveness, best practices and integration. Comparisons between and among nonresidential program design, marketing and delivery strategies will be a key element of this process evaluation. In particular, this study will address the effectiveness of different delivery strategies such as the different approaches taken within the nonresidential audit and direct install program components. In addition, the effectiveness of different financial assistance models, including the core calculated v. deemed incentive approaches and, in particular, the On Bill Financing approach. Best practices in program marketing and delivery will also be a focus of this evaluation, including ME&O strategies, project identification/screening processes, and whole building approaches. This evaluation will also include an assessment of benchmarking strategies and recommendations for best practices in this area. It will also be important to assess the effectiveness of nonresidential retrofit programs in integrating with the ETP program. Process evaluations of pilot, new and significantly modified programs (e.g., CEI, RCx, etc.) will also be included in this study. | $1,750,000 | IOU | $0 |
| Nonres | EBCx | Program Delivery and | Process Evaluation | Energy Savings Calculation Tools | 20 | **Energy Savings Calculation Tools Development for Existing Building Commissioning (EBCx) Program.** This study involves the review and development | $0 | IOU | $112,000 |

| Res/ Nonres/ CC | Pgm/ Pgm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
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| | | Implementation Assessment | | Development for Existing Building Commissioning (EBCx) Program | | of energy savings calculation tools for common, low-savings EBCx (Existing Building Commissioning) measures. The tools are targeted for use on common measures with relatively low savings, which make up a significant portion of the EBCx measures identified during the 2006-2009 PECI RCx program but a small portion of the overall program savings. The tools are expected to help the program effectively target small to mid size buildings at lower cost, streamlining the participation process and still maintaining a sufficient level of program-wide rigor and consistency. All issues pertinent to the unfolding of these expectations will be investigated thoroughly. Moreover, new savings estimation procedures will be assessed for quality, consistency and effectiveness in both delivery and outcome. | | | |
| Nonres | NC | Program Delivery and Implementation Assessment | Process Evaluation | Nonresidential New Construction Process Evaluation and Market Characterization | 21 | **Nonresidential New Construction Market Characterization and Process Evaluation.** This study will examine the market structure and decision making of the nonresidential new construction market. The study will provide market characterization and AKA-B measurement. It will also provide process evaluation of the Savings by Design program, identifying best practices and investigating new and enhanced program opportunities. Particular attention will be paid to the refinement of marketing and outreach strategies, with a focus on recruiting promising sectors, and improving the training of field representatives.<br><br>This study will characterize baseline building practices, market shares and remaining potential by ownership type and building type. It will leverage and build upon previous research conducted on program penetration and potential that was completed for the years 2004-2009. | $350,000 | IOU | $0 |
| CC | Lighting | Program Delivery and Implementation Assessment | Process Evaluation | Lighting Programs Process Evaluation and Market Characterization | 22 | **Lighting Market Characterization and Process Evaluations.** This study includes several components focused on the Upstream Lighting Program, including basic CFLs as well as advanced lighting products. It also addresses the EM&V information needs for the Lighting Market Transformation (LMT) Program.<br><br>This study includes Phase 1 and 2 of the Advanced Lighting Baseline Study being managed by the IOUs. This study includes data mining from the 2006-2008 Upstream Lighting Program impact and process evaluations, as well as additional data collection including the purchase of POS lighting sales data from commercial vendors. As such, this study will be closely coordinated with the residential market share tracking study.<br><br>In addition, this study includes a component designed to characterize the supply-side market for basic and advanced lighting products. This study will build from earlier research conducted by ED and the IOUs, as well as explore new distribution channels as indicated by the LMT Program and Emerging Technologies Program.<br><br>This study also includes a process evaluation component specifically focused on the LMT Program. The process evaluation will assess the success of the lighting | $1,500,000 | TBD | $0 |

| Res/ Nonres/ CC | Pgm/ Pgm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
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| | | | | | | technology roadmap in providing insight that that was effectively integrated into program design.<br><br>This study will be highly coordinated with impact evaluations focused on upstream lighting measures. In addition, this study will coordinate with the measure cost study. Finally, this study will be coordinated with AKA-B measurement research to track changes in the underlying lighting market conditions, including upstream, midstream and downstream perspectives. | | | |
| CC | HVAC | Program Delivery and Implementation Assessment | Process Evaluation | HVAC Programs Process Evaluation and Market Characterization | 23 | **HVAC Market Characterization and Process Evaluation.** This study is comprised of several components. First, this study will build from work initiated in 2009 to mine existing data for insight about HVAC maintenance strategies to both inform current program design as well as the need for further research. A follow-up study is also proposed to fund the research recommended through this initial study. This follow-up study will likely include field measurements and laboratory research.<br><br>This study also includes two research components designed to develop deeper understanding of both end-user and market actor awareness, attitudes, wants and needs, and decision-making processes related to HVAC systems and measures. The research will be conducted in phases, with Phase 1 consisting primarily of a literature review and analyses of secondary data and Phase 2 involving primary data collection to fill critical gaps.<br><br>Finally, this study includes an overarching process evaluation of all HVAC programs and subprograms included within the 2010-2012 portfolio. The goals of the process evaluation are to evaluate the effectiveness of marketing strategies and incentives, contractor training and quality assurance, and trade industry networking. In addition, the process evaluation will include research designed to understand purchase decision making behavior and equipment supply and stocking considerations. | $900,000 | TBD | $155,000 |
| CC | LGP | Program Delivery and Implementation Assessment | Process Evaluation | Local Government Partnerships Program Process Evaluations | 24 | **Local Government Partnerships Program Process Evaluation.** This study will include a case study comparison of LGP models operating in different IOU service territories. Research issues will include an assessment of whether or not LG jurisdictions have experienced capacity improvements and/or implemented permanent changes in energy efficiency policies and practices. In addition, this study will assess administrative costs across different program models, and identify factors contributing to success (or lack of success) in integrating with IOU programs. | $300,000 | ED | $0 |
| CC | ME&O | Program Delivery and Implementation Assessment | Process Evaluation | ME&O Program Process Evaluation | 25 | **ME&O Program Process Evaluation.** This study will provide a comprehensive AKA-B study focused on providing a baseline for the measurement of the achievements of new ME&O campaigns. The scope of AKA-B baseline research must be consistent with objectives of ME&O campaigns. This work may leverage | $400,000 | IOU | $104,000 |

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| | | | | | | the 2010 Energy Conservation, Efficiency, and Demand Response Survey (ECEDR). This effort will include data collection spanning major California spoken languages and provide sector and IOU specific analysis results.<br><br>This study also provides an in-depth program delivery and implementation assessment. This assessment will focus on all stages of implementation, including the processes engaged in the design and development of brand and campaign strategies. Moreover it will assess specific AKA-B and adoption effectiveness outcomes resulting from of specific messaging and channel selection.<br><br>Another component of this study will focus on furthering development of evaluation methods that provide consistent and reliable measurement of program effects. As an extension of such research, this study component will identify related evaluation data requirements and program tracking best practices. | | | |
| CC | WET | Program Delivery and Implementation Assessment | Process Evaluation | WET and Related Educational Program Process Evaluations | 26 | **WET and Related Educational Program Process Evaluations.** This study includes in-depth program delivery and implementation assessments of Workforce Education & Training programs. This component will provide rapid feedback to program management for programs in critical early stages of deployment. Evaluation scope will include a overarching effort to assess adoption effectiveness and best practices, leveraging measured outcomes across the full array of program strategies and markets. This component will also develop and refine logic models as needed.<br><br>This study will also have a curriculum development component. This component will provide recommendations, updates and refinements to training curriculum, leveraging the outcome of the statewide WET needs assessment. It will address previously identified recommendations for improvements to elementary school curriculum, as well developing enhancements for application to WET Centergies curriculum.<br><br>This study will include a component focused on the development of optimal evaluation methods, related data requirements, and best practices in program tracking. In addition to developing new methods, and comparing known methods, this component will perform an evaluability assessment for new or unique programs. | $500,000 | IOU | $0 |
| CC | ETP | Program Delivery and Implementation Assessment | Process Evaluation | ETP Process Evaluation and Market Assessment | 27 | **ETP Market Assessment and Process Evaluation.** The ETP evaluation study will include program delivery and implementation assessment, program impact, as well as market structure and decision making elements.<br><br>One focus of this study is to ensure a balance of portfolio efforts during the initial stages of program planning. This will serve to support strategic plan objectives related to the promotion of specific technologies such as advanced HVAC, plug loads, advanced lighting and ZNE technologies. Balance also needs to be preserved between "proven" underutilized technologies with little market | $900,000 | ED | $0 |

| Res/ Nonres/ CC | Pgm/ Pgm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
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| | | | | | | traction and "new" advanced technologies that meet Strategic Plan goals. Other key balancing factors include fuel types, end-use applications, and consideration of market potential.<br><br>The program delivery and implementation assessment component includes an update to the 2010-2012 logic models as well as revisions to the program implementation plan and SMART objectives. It will examine closely the screening and selection criteria of candidate technologies, in particular for the Technology Assessments, Scaled Field Placements, Demonstration Showcases and Technology Development Support subprograms. This evaluation will consider the balance and selection process related to the selection of test sites, participants, climate zones and applications. This component of the evaluation also includes updating the ETP database to review tracking data quality and assess whether tracking methods adequately address evaluation and program management data needs. This assessment will confirm consistent naming and numbering conventions have been implemented, among other previously identified improvements.<br><br>The impact evaluation component of this study will be used to evaluate the extent to which the program objectives and key program outcomes have been achieved. In particular the evaluation will determine the degree to which the program contributed to increased measure awareness, market knowledge and reduced performance uncertainties for ETP stakeholders and IOUs' customers. Ultimately, the evaluation will determine if ETP contributed to increased technology supply and market traction and support the advancement of SP Big Bold Goals including ZNE. This evaluation study will also assess the estimated energy savings of the adopted ET measures into the EE portfolio.<br><br>The market assessment component of this study will include a market characterization component focused on the energy efficiency technology market. Among the primary objectives of this effort is the study of market actors and the competitive landscape. Emphasis will also be placed on research needs and the process by which these are articulated and filled. | | | |
| CC | IDSM | Program Delivery and Implementation Assessment | Process Evaluation | "Omnibus" IDSM Program Process Evaluation | 28 | **"Omnibus" IDSM Program Process Evaluation.** This study will include a program implementation and delivery assessment of the IDSM program. Objectives of this component include a review of related program pilots, with a focus on providing timely feedback. This component will include a best practices assessment that compares strategies and outcomes across programs incorporating integrated energy solutions, both within and outside California.<br><br>Market structure and decision making study focused on market actors and market processes central to delivery of integrated solutions. The study will develop new program strategies and identify opportunities that direct program resources toward the most cost effective strategic implementation of integrated solution support. | $250,000 | ED | $0 |

| Res/ Nonres/ CC | Pgm/ Pgm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
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| CC | C&S | Program Delivery and Implementation Assessment | Process Evaluation | C&S Market Assessment and Process Evaluation | 29 | **Codes & Standards Market Assessment and Process Evaluation.** This study will provide a comprehensive analysis of the codes and standards markets in California. It will characterize the code compliance market, including documenting standard practices and key market processes in the context of market transformation and programmatic goals.<br><br>This study will also provide a program implementation and delivery assessment for the statewide codes and standards programs. This component will have a best practices assessment that studies strategies, outcomes and lessons learned in other jurisdictions. It will also include an in-depth process evaluation, incorporating a rapid feedback process evaluation for the Compliance Enhancement Sub-Program and the Reach Codes Sub-Program.<br><br>This study will have a methods component to develop and update evaluation methodologies for C&S programs. This will include the enhancement of NOMAD methods and the development of evaluation protocols for new or critical C&S subprograms. For select new or unique program strategies, methods research will focus on evaluability assessments (e.g. C&S data dictionary). Methods research will focus on baseline development and assessing the mechanisms governing market penetration of products governed by codes.<br><br>Finally, this study will include a component focused on lighting. In particular, this study will provide a statewide lighting energy use baseline characterization that covers indoor residential, indoor commercial and outdoor lighting sectors. Key study outcomes include the creation of a model of lighting energy use in California that will support scenario analysis for testing the projected savings of alternative program strategies. From this model, the Codes and Standards Program will be able to identify a code specific pathway to achieving the lighting use reduction goals established in AB 1109. | $500,000 | TBD | $17,200 |
| CC | All | Program Delivery and Implementation Assessment | Process Evaluation | Early EM&V Research for All Programs | 30 | **Early EM&V for All Programs.** This study area will include early EM&V research activities to be conducted by IOUs as a component of improving ongoing program performance (e.g., short turnaround research to support work paper updates). This study area could address research needs for any program, residential or nonresidential. | $500,000 | IOU | $0 |
| CC | ZNE | Program Delivery and Implementation Assessment | Process Evaluation | ZNE Market and Process Assessment | 31 | ZNE Market and Process Assessment. This study will define an optimal pathway for the achievement of the CA Strategic Plan ZNE goals. This study will span all relevant sectors, including new construction and existing buildings. This study will focus on defining the required acceleration of codes and standards stringency, as well as supplemental programs, policies or procedural strategies to ensure successful implementation. In particular, the study will consider expanding Title 20 and 24 to address all significant end uses and determine required improvements in the coordination of code development across local, state, and federal jurisdictions. This study will also provide the timely address of near term concerns, including but not limited to the appropriate treatment cost- | $1,400,000 | IOU | $0 |

| Res/ Nonres/ CC | Pgm/ Pgm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
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| | | | | | | effectiveness and compliance in the context of ZNE Standards.<br><br>This study includes a program delivery and implementation assessment component that has an early EM&V planning component. The IOUs will develop a plan to create and utilize ongoing and timely evaluation results to continuously improve integrated program offerings of the ZNE pilot programs. The early planning component will also detail the process evaluation of ZNE pilot programs, and a best practices assessment that will seek to integrate the lessons learned from programs with similar goals and/or designs. It will also propose additional study elements (or sub-studies) identified as critical to the creation of a statewide roadmap to achieve ZNE goals. As the evaluation progresses through the 2010-2012 cycle, additional ZNE strategic support studies will be proposed for the next program cycle (2013-2015).<br><br>This study will include a technical potential element focused on the assessment of building types with respect to their technical potential to achieve net zero-energy in the Commercial Sector.<br><br>This study will include a targeted market structure and decision making component. The focus of this element will be on markets and market processes on the critical path to achieving ZNE goals. This will identify and characterize primary market transformation barriers, and prioritize the need to address those barriers in the context of related costs, benefits and feasibility. Attention will be paid to key market actors and their perspectives within the context of relevant markets and service territories, and to developing ZNE market segmentation and differentiation at the local, sector and statewide level.<br><br>This research will seek new and enhanced program strategies in support of ZNE goals, which will supplement or improve the existing portfolio. This study should be coordinated carefully with related scope addressed in the C&S study, the new construction market studies, the IDSM study, and the ZNE potential, costs and goals sub-study. | | | |
| Res | OPOWER | Program Delivery and Implementation Assessment | Process Evaluation | Evaluation of PG&E's OPOWER Pilot Program | 32 | **Evaluation of PG&E's OPOWER Pilot Program.** The goals of this study are to validate the methods being used to determine energy savings impacts from comparative energy use programs, including experimental design, sample frames, control group characteristics, random assignment and multivariate data analysis. In addition, the ex-post impact evaluation should be designed to determine energy savings for groups and sub-groups of the samples, as well as assess persistence of energy savings overtime. Cost-effectiveness analyses should also be conducted for different customer groups to inform future program design. [Note: this study is not the ED-managed impact evaluation of this pilot program; ED and its contractors are providing input and oversight to PG&E's initial effort to design the experiment and select the samples. The full-scale evaluation of comparative use programs will be included in the custom impact evaluation scope.] | $350,000 | IOU | $0 |

| Res/ Nonres/ CC | Pgm/ Pgm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
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| CC | All | Program Delivery and Implementation Assessment | Process Evaluation | SCE's Enhanced Inspection Study | 33 | **SCE's Enhanced Inspection Study.** Process evaluation study focused on improving SCE's internal QA/QC and inspection procedures | $479,000 | IOU | $0 |
| CC | All | Program Delivery and Implementation Assessment | Process Evaluation | SCE's Catalina Island Program Improvement Assessment | 34 | **SCE's Catalina Island Program Improvement Study.** Study focused on gathering data for a pilot effort on how to reach this high-cost-to-serve area. | $0 | IOU | $25,000 |
| Nonres | All | Program Delivery and Implementation Assessment | Best Practices Assessment | ACEEE "Big Savers" Best Practices Study | 35 | **ACEEE "Big Savers" Best Practices Study.** An IOU funded "best practices" study designed to highlight how market actors have achieved large savings. | $40,000 | IOU | $0 |
| CC | All | Program Delivery and Implementation Assessment | Best Practices Assessment | Overarching Best Practices Assessment | 36 | **Overarching Best Practices Assessment.** This study will include a best practices assessment for program-specific intervention strategies, as well as across programs targeting similar markets and/or technologies (may include research outside of CA). The goal for this study is to identify and direct data collection and analysis as part of market, process and impact evaluation studies being conducted for specific markets, programs and measures. | $500,000 | ED | $0 |
| CC | All | Program Delivery and Implementation Assessment | Adoption Effectiveness Assessment | Adoption Effectiveness Assessment | 37 | **Adoption Effectiveness Assessment.** This study will focus on assessing participation/measure adoption levels by customer class, market sector, etc. as well as analysis of the key factors driving participation/measure adoption rates. The goal for this study is to identify and direct data collection and analysis as part of market analysis and process evaluation studies being conducted for specific markets and programs. This study area will also integrate the results of the adoption effectiveness analyses conducted as part of the individual program evaluation studies. | $250,000 | ED | $0 |
| CC | All | Program Delivery and Implementation Assessment | Integration Strategy Assessment | Overarching Study on Integration Effectiveness | 38 | **Overarching Study on Integration Effectiveness.** This study will focus on assessing the effectiveness of integration strategies, including integration of various EE programs, as well as low income, DG and DR. The goal for this study is to identify and direct data collection and analysis as part of market, process and impact evaluation studies being conducted for specific markets, programs and measures. | $250,000 | ED | $0 |
| CC | All | Program and Measure Costs | Program and Measure Costs | Measure Cost Study | 39 | This study will focus on verification and estimation of measure and program costs. Measure costs will be estimated using a variety of primary and secondary research techniques from data collected from program records and the broader market place. Because of the large number and variety of technologies and measures included in utility program filings, no single data collection and analysis strategy is suitable for developing accurate cost data. Instead, different data collection strategies must be appropriately matched to the unique estimation challenges that each technology, measure, and program presents. | $2,000,000 | ED | $0 |
| CC | All | Program and Measure Costs | Program and Measure Costs | Measure Cost Study Data Collection Support | 40 | This study area will focus on capturing cost data collection economies-of-scale through other EM&V studies such as impact evaluation, process evaluation, market studies, and potential studies. These cost data will generally be provided to the primary Measure Cost Study team for analysis, although in some cases the Measure Cost team may direct the other study team to conduct a specific | $500,000 | ED | $0 |

| Res/ Nonres/ CC | Pgm/ Pgm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
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| | | | | | | measure cost analysis. | | | |
| CC | All | Portfolio Strategy and Management Assessment | Portfolio Strategy and Management Assessment | Portfolio Strategy and Management Assessment | 41 | This activity area will address the managerial and strategic aspects of portfolio implementation. Research will focus on management structures, implementation systems, work flow management procedures, expenditure and accomplishment tracking, use of information technology and other performance enhancement tools, staffing and incentives, time allocation and tracking, as well as other needs as identified through the EM&V needs assessment process. | $3,000,000 | ED | $0 |
| CC | All | Portfolio Impacts | Portfolio Impacts | Portfolio Impacts | 42 | The portfolio impact area will focus on providing strategic and tactical direction for the data collection and analysis activities in those studies and on integrating and synthesizing the results across measures, programs, and markets. This activity area will also focus on continuous examination of whether there are any remaining high-priority gaps across the individual impact evaluation and market analysis areas. Any priority gaps identified will be addressed through development of additional data collection and analysis activities which will be assigned to the most appropriate impact study or activity area or addressed through the development and implementation of new studies. | $2,000,000 | ED | $0 |
| CC | All | Portfolio Impacts | Market Effects | Market Effects and Transformation Research | 43 | This study area will be responsible for identifying and managing research efforts associated with market effects and market transformation. This research may be exploratory and qualitative in nature and is not intended to be predicated solely on quantification of impacts associated with program and non-program market interventions. Market effects research will likely be conducted as a combination of leveraged data collection and analysis as part of market analysis and program evaluation studies, as well as through stand-alone studies. | $2,500,000 | TBD | $0 |
| CC | All | Portfolio Costs | Portfolio Costs | Portfolio and Program Financial Audit & Analysis | 44 | This activity area will focus on investigating the expenditures allocated for the management and implementation of programs; and costs associated with overall portfolio administration, including general, administrative, and overhead. The portfolio costs study area will conduct a compliance review of the utilities' financial operations, evaluate the overall use of energy efficiency expenditures, and provide recommendations for improving the financial systems and related policies. | $3,000,000 | ED | $0 |
| CC | All | Energy Consumption, Saturation, and Market Share | Macro Consumption | Macro Consumption White Papers | 45 | This study activity will focus on the development of a set of parallel white papers by 3-5 teams of leading economists and researchers that explore and assess a range of alternative, "top-down" evaluation methodologies from a variety of perspectives relevant to the CPUC's needs. The scope of the white papers will include a comprehensive review and assessment of possible top-down evaluation approaches (and other related studies as deemed appropriate) that have been or could be used to assess the load impacts of energy efficiency programs, including identification of meaningful energy intensity, structural, and behavioral indicators for different sectors of utility end-use customers. For each alternative approach, the white papers will assess and describe the pros, cons, and tradeoffs of each including data requirements, time and resource requirements, precision, and sources of uncertainty. Finally, the white papers will also include recommendations for specific top-down evaluation approaches that would appropriately supplement and add value to the CPUC's existing bottom-up EM&V | $150,000 | ED | $0 |

| Res/ Nonres/ CC | Pgm/ Pgm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
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| | | | | | | and planning activities and provide a detailed proposal to conduct a pilot study to implement the authors' preferred approach(es) using existing data (including data that could be developed from existing data sources). | | | |
| CC | All | Energy Consumption, Saturation, and Market Share | Macro Consumption | Macro Consumption Pilot Studies | 46 | Based on the assessments and recommendations provided in the macro-consumption white papers, one to three proposed pilot studies will be chosen for "proof of concept" implementation and demonstration using existing data sources in California. The results of the pilot studies will be evaluated by the Energy Division and stakeholders through a series of public workshops and presentations with respect to the value of EM&V-related information derived from the pilot studies, the relative cost and ease of implementation, and the potential to be expanded and improved using new primary data. These pilot studies will produce recommendations and an assessment of pros and cons of pursuing subsequent full-scale and ongoing studies inclusive of any primary data collection requirements. | $500,000 | ED | $0 |
| Res | All | Energy Consumption, Saturation, and Market Share | Saturation | Residential On-Site/Metering Survey | 47 | This study is a detailed residential on-site baseline survey that includes a large sample of homes. This study utilizes trained surveyors to collect detailed information about the dwelling structure and energy-related equipment and usage characteristics. Options include a detailed plug load sub-study, sub-metering, and over-sampling to capture statistically significant results for new construction, and individual building types. | $2,000,000 | ED | $0 |
| Res | All | Energy Consumption, Saturation, and Market Share | Saturation | Residential Appliance Saturation Survey (RASS) | 48 | The California Residential Appliance Saturation Study (RASS) is primarily a mail survey that involves a sample of over 20,000 homes. This study asks basic questions about dwelling structure and appliance holdings and usage. In addition to appliance saturation estimates, a statistical analysis is performed to develop end use consumption estimates. The 2009 California RASS was completed in mid-2010. Thus, the RASS analysis effort, as a part of the 2010-2012 EM&V plan, will be limited to further data mining of the 2009 RASS data rather than implementation of a new RASS. | $200,000 | ED | $0 |
| Nonres | All | Energy Consumption, Saturation, and Market Share | Saturation | Industrial Customer Surveys | 49 | There are several possible components of this study. The first involves phone surveys to collect information about presence of end uses, general efficiency levels, and customer awareness, and to validate NAICS coding. The second includes onsite data collection to confirm or adjust MECS end use shares, assess energy efficiency potential, and further validate NAICS codes. Finally, the third involves surveys and audits of the largest industrial customers to develop comprehensive data on industrial facilities, including end use shares, energy efficiency potential, and NAICS code validation. | $450,000 | ED | $0 |
| Nonres | All | Energy Consumption, Saturation, and Market Share | Saturation | Industrial End Use Saturation Study (IEUS, pre 2010-2012) | 50 | The Industrial End Use Saturation Study (IEUS) was initiated several years ago by the IOUs. The project is currently on hold pending resolution of several issues. | $0 | ED | ######### |
| Nonres | All | Energy Consumption, Saturation, and Market Share | Saturation | Commercial Saturation Survey | 51 | The key characteristics of this study are that it utilizes detailed on-site surveys for data collection, has sample sizes large enough to produce statistically significant results for major building types, and integrates building site characteristic data with energy consumption and load shape metering data. The study will provide | $5,000,000 | ED | $0 |

| Res/ Nonres/ CC | Pgm/ Pgm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
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| | | | | | | baseline and longitudinal data for numerous planning, evaluation, and policy purposes. Several options of widely varying costs and scope are under consideration. | | | |
| Res | All | Energy Consumption, Saturation, and Market Share | Market Share Tracking | Residential Market Share Tracking | 52 | The Residential Market Share Tracking (RMST) study has historically tracked the sales of high efficiency measures (CFLs, HVAC, Appliances (Dishwashers, Clothes Washers, Refrigerators, Room Air Conditioners) by year. The data comes from a variety of sources including retailer point of sales (POS) data purchased from vendors (Lighting), individual retail sales data gathered from a sample of store fronts (Appliances), and distributor sales data (HVAC). This project includes a feasibility study to determine the best way to continue the RMST. Possibilities include, but are not limited to, coordinating with the CLASS and RNC studies and/or working with buying groups and building departments to get additional data. | $750,000 | ED | $0 |
| Nonres | All | Energy Consumption, Saturation, and Market Share | Market Share Tracking | Commercial Market Share Tracking | 53 | The Commercial Market Share Tracking (CMST) study will track sales of high efficiency measures installed in non-residential buildings. To keep costs at a minimum, this study will be closely coordinated with the CEUS study. Phone surveys will be used to find non-residential new purchasers of targeted equipment. Self reported sales and efficiencies will be verified with on-site surveys. The budget estimate assumes that 4-6 measure groups will be tracked. | $1,000,000 | ED | $0 |
| Nonres | All | Energy Consumption, Saturation, and Market Share | Market Share Tracking | Industrial and Agricultural Market Share Tracking | 54 | The Industrial/Agricultural Market Share Tracking (CMST) study will track sales of selected high efficiency and standard practice technologies in the industrial and agricultural sectors. | $500,000 | ED | $0 |
| Res | All | Market Structure & Decision-making | Market Assessment | Overarching Residential Sector Market Assessment | 55 | **Overarching Residential Sector Market Assessment Study.** The goal of these studies is to provide funding for ED-managed research and analysis designed to address overarching issues, including AKA-B related issues, market characterization, program innovation and opportunity assessments, and standard practice research for programs targeting the residential sector. Similar to the ED-managed overarching process evaluation studies, these studies will draw on primary research conducted as part of other studies but may also include stand-alone research to fill gaps, will provide interim reports as well as more annual and final reports documenting the full effort, and, as appropriate, will report on results related to PPMs, MTIs and other strategic planning goals and objectives. | $300,000 | ED | $0 |
| Nonres | All | Market Structure & Decision-making | Market Assessment | Overarching Nonresidential Sector Market Assessment | 56 | **Overarching Nonresidential Sector Market Assessment Study.** The goal of these studies is to provide funding for ED-managed research and analysis designed to address overarching issues, including AKA-B related issues, market characterization, program innovation and opportunity assessments, and standard practice research for programs targeting the nonresidential sector. Similar to the ED-managed overarching process evaluation studies, these studies will draw on primary research conducted as part of other studies but may also include stand-alone research to fill gaps, will provide interim reports as well as more annual and final reports documenting the full effort, and, as appropriate, will report on results related to PPMs, MTIs and other strategic planning goals and objectives. | $300,000 | ED | $0 |
| Nonres | All | Market Structure | Market | Industrial Sector | 57 | **Industrial Sector Market Characterization Study.** The goal of this study is to | $225,000 | IOU | $0 |

| Res/ Nonres/ CC | Pgm/ Pgm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
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| | | & Decision-making | Assessment | Market Characterization Study | | characterize energy use and energy efficiency in the CA industrial sector. The study will develop and present data on the CA industrial sector, including end use consumption estimates, load shapes, key end uses and measure to target for energy efficiency, and a gap analysis between potential and recent program accomplishments. | | | |
| Nonres | All | Market Structure & Decision-making | Market Assessment | Agricultural Sector Market Characterization and Potential Study | 58 | **Agricultural Sector Market Characterization and Potential Study.** This study will be designed to identify opportunities for energy efficiency, demand response and self-generation within the agricultural sector. Components of this study may include a literature review, market and energy usage characterization, a customer needs assessment, gap analysis, saturation and baseline analyses for specific technologies, and a potential study for the most promising opportunities. | $0 | IOU | $400,000 |
| CC | All | Market Structure & Decision-making | Market Assessment | Building/Facility Renovation/Remodel Rates Study | 59 | **Building/Facility Renovation/Remodel Rates Study.** This study will develop updated estimates of renovation/remodel rates by building type, CZ, and vintage. | $300,000 | IOU | $0 |
| Res | All | Market Structure & Decision-making | Market Assessment | Consumer Preference Research to Support Lighting Programs | 60 | **Consumer Preference Research to Support Lighting Programs.** This study is being managed by PG&E using 2010-2012 program funds. ED will continue to provide input in the study design, analysis and results reporting. It is expected that the study will provide guidance for key program design considerations including product mix, incentive levels and allocation among distribution channels. | $0 | IOU | $150,000 |
| CC | All | Market Structure & Decision-making | AKA-B Metrics and Measurement | Measurement and Reporting on AKA-B Metrics | 61 | **Measurement and Reporting on AKA-B Metrics.** Develop and measure baseline and ongoing AKA-B metrics, overall and for specific segments, reporting on changes over time and key drivers of changes | $250,000 | ED | $0 |
| Res | All | Market Structure & Decision-making | Market Assessment | CEE Energy Star Awareness Survey | 62 | **CEE Energy Star Awareness Survey.** An IOU-funded effort to obtain a CA over-sample from the national CEE Energy Star Awareness Survey. | $0 | IOU | $30,000 |
| CC | All | Manage EM&V | Manage EM&V | Manage EM&V (Special Studies, Evaluation Guidelines) | 63 | The activity area will support research focused on improving existing EM&V methods and guidance within the context of cost-effectively meeting the CPUC's goals and objectives for EM&V. | $1,000,000 | ED | $0 |
| CC | All | Manage EM&V | Manage EM&V | EM&V Best Practices Study | 64 | This study will conduct a review of EM&V issues, approaches, and best practices both within and outside the energy-efficiency field. | $200,000 | ED | $0 |
| CC | All | Manage EM&V | Manage EM&V | Evaluation Methods and Procedures Assessment | 65 | This study will entail a review of energy-efficiency program evaluation-related methods and issues by leading evaluators outside of the energy efficiency field. | $200,000 | ED | $0 |
| CC | All | Ex Ante Development and Approval | Ex Ante | Database for Energy Efficiency Resources (DEER) | 66 | Ex-ante estimates will be developed based on best available data and methodologies. Activities include (1) adding new measures, (2) gross and net impact parameter updates, (3) statistical analysis and mining of existing sources to support developing ex ante updates, (4) measure cost analysis and updates, (5) useful life and technical degradation updates, (6) software and documentation upgrades, and (7) coordination with 2010-2012 impact evaluation and cost data collection and analysis activities | $4,000,000 | ED | $0 |
| CC | All | Ex Ante | Ex Ante | Support Ex Ante | 67 | This study area provides technical consulting to support Energy Division's review | $2,000,000 | ED | $0 |

| Res/ Nonres/ CC | Pgm/ Pgm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
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| | | Development and Approval | | Development, Review, & Approval (includes non-DEER) | | and approval of IOU ex ante values. IOU filings, work papers, cost effectiveness calculations, and tracking systems will be reviewed to confirm correct use and application of DEER values for DEER measures. For non-DEER measures and parameters, methods, data, sources, and assumptions will be reviewed to assure use of best-available-information. As requested by Energy Division, new or modified methods, data, and sources may developed for non-DEER measures. | | | |
| CC | All | ED Reporting | ED Reporting | ED Reporting | 68 | This activity area will focus on Energy Division's regulatory-related reporting requirements for energy efficiency. This will include data management activities associated with IOU submittals of program accomplishments and all associated tracking and reporting compliance data. It will also include all Energy Division management, analysis, and reporting activities associated with integrating program, portfolio, and market analysis results into regulatory-required reports of overall IOU energy efficiency impacts, costs, and cost effectiveness. | $2,000,000 | ED | $0 |
| CC | All | ED Reporting | ED Reporting | Savings Decay and Cumulative Goals Analysis | 69 | This study will estimate the effect on cumulative goals of measures with short measure lives and concomitantly examine the likelihood of re-adoption of such measures at the end of their initial service life. The results of this analysis will be compared to the current CPUC policy requirements that IOUs must replace 50% of the savings associated with short-lived measures to meet cumulative goals requirements. | $100,000 | ED | $0 |
| CC | All | ED Reporting | ED Reporting | Energy Efficiency Load Forecasting Integration | 70 | This study will continue work on introducing stochastic/probabilistic modeling approaches for EE resources into load forecasting and procurement. It will also continue work efforts to harmonize inputs and methods for CEC load forecast and CPUC Potential and Goals Study. | $250,000 | ED | $0 |
| CC | All | ED Reporting | ED Reporting | Update and Refine Cost-Effectiveness Tools | 71 | This study area will review, assessment, and updating of tools to calculate cost-effectiveness for measures, projects, programs, and portfolios. | $500,000 | ED | $0 |
| CC | All | Develop Goals and PPMs | Goals | EE Goals Integration Study | 72 | The EE Goals Study will incorporate the findings from an updated EE Potential Study, savings estimates associated with reach codes and improvements in code compliance, and leverage information from Market Characterization studies of zero net energy new construction programs in order to develop revised forecasts of potential TMG savings in each IOU service territory. | $500,000 | ED | $0 |
| CC | ZNE | Develop Goals and PPMs | Goals | Zero Net Energy Potential, Costs, and Goals Sub-Study | 73 | This study will focus on improving estimation of the costs, savings, feasibility, and potential adoption of ZNE homes and buildings. This research will coordinate with and integrate results from related ZNE market characterization and roadmap studies. ZNE data and results will be prepared for inclusion in the EE Goals Integration Study. | $250,000 | ED | $0 |
| CC | C&S | Develop Goals and PPMs | Goals | T24/T20 and "Reach Codes" Compliance Study | 74 | This study will develop updated estimates of T24/T20 and "reach code" compliance rates by building type, CZ, and vintage. | $250,000 | ED | $0 |
| CC | All | Develop Goals and PPMs | Goals | Strategic Plan Feasibility and Cost- | 75 | This study will assess the feasibility and cost effectiveness of the targets and objectives in the strategic plan. | $250,000 | ED | $0 |

| Res/ Nonres/ CC | Pgm/ Pgm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
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| | | | | Effectiveness Study | | | | | |
| CC | All | Develop Potential and Future Cycle Ex Ante | Potential | Plug Loads Potential Study | 76 | This study will develop forecasts of achievable savings potential from IOU programs targeting plug loads. | $350,000 | ED | $0 |
| CC | NC | Develop Potential and Future Cycle Ex Ante | Potential | New Construction Energy Efficiency Potential | 77 | This study will focus on developing all of the primary data necessary to update forecasts of achievable savings potential from new construction programs | $250,000 | ED | $0 |
| CC | All | Develop Potential and Future Cycle Ex Ante | Potential | Integrated Energy Efficiency Potential Study | 78 | This study will develop comprehensive, updated forecasts of technical, economic, and achievable savings potential from IOU programs and related non-IOU programs and policies | $1,500,000 | ED | $0 |
| CC | All | Develop Potential and Future Cycle Ex Ante | Potential | Customer Adoption Behavior Study | 79 | Potential models often use functions that simulate customer adoption of energy efficiency measures in response to utility program incentives and other interventions. Existing models incorporate recent adoption data in order to calibrate adoption forecasts. However, the fundamental adoption functions and relationships are mostly derived from a limited set of adoption behavior studies that have not recently been updated. Updating adoption functions will help to ensure that the potential study and the savings goals reflect the most accurate and recent data available. The study of customer adoption behavior will use both existing secondary data sources and primary data collection to better characterize the influence of rebates, payback, first cost, and relative equivalence of other product features on customer adoption behavior. | $500,000 | ED | $0 |
| CC | All | Support Strategic Planning and Policy | Strategic Plan | Information and Services to Support Update to CPUC EE Strategic Plan | 80 | This activity area will provide support to the CPUC's Strategic Planning process, as well as support to the overall energy efficiency policy making process. This category of analysis will inform ongoing strategic planning goals and objectives by providing funding for evaluation efforts that may not currently or fully anticipated but will be critical to maintaining continuous forward progress toward meeting these stated goals and objectives. It will include development of the next Strategic Plan and related ED consultant support. | $2,000,000 | ED | $0 |
| CC | All | Support Strategic Planning and Policy | Policy Support | Review and Refine Cost-Effectiveness Methods and Inputs | 81 | This study area will include<br>• Review and assessment of cost-effectiveness metrics and methods<br>• Review and assessment of non-energy benefits inputs into cost-effectiveness metrics<br>• Review and assessment of environmental adder inputs into cost-effectiveness metrics<br>• Review and assessment of avoided cost inputs into cost-effectiveness metrics<br>• Review and assessment of EUL inputs into cost-effectiveness metrics | $500,000 | ED | $0 |
| CC | All | Support Strategic Planning and Policy | Strategic Plan | Other Strategic Plan Support | 82 | This area will be used to conduct targeted studies needed to support the Strategic Plan and inform EE policy making. The latter studies will be those that are not otherwise being conducted in other EM&V activity areas. Areas of direct overlap, particularly those associated with direct evaluation of program impacts and effectiveness, as well as estimation of measure/system impacts and costs, will be conducted in the EM&V activity areas and studies responsible for those topics. | $2,100,000 | ED | $0 |

# Table A.2 – Sorted by Sector

| Res/ Nonres/ CC | Pgm/Pgm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
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| Res | All | Program Delivery and Implementation Assessment | Process Evaluation | Overarching Process Evaluation of All Residential Programs | 8 | **Overarching process evaluation of all residential programs.** The goal of this study is to provide funding for ED-managed research and analysis designed to address overarching program delivery and implementation issues, including adoption effectiveness, best practices and integration effectiveness. For the most part, these studies will draw on primary research conducted as part of IOU-led process evaluations, as well as other sources (e.g., market studies, impact studies, etc.). In addition, the scope of this study could include stand-alone research that ED conducts to fill gaps not covered by the IOU-led process evaluations. For example, particular emphasis may be given to areas of strategic interest to the CPUC, including the assessments of comparative use and other behavioral change program models, integration of emerging technologies into core residential programs and cost-effectiveness assessments of different marketing and outreach strategies. This study will produce quarterly reports in an effort to provide more timely feedback to program planners and portfolio managers. Annual reports and a final report will also be generated, documenting interim findings and actions taken by IOUs to improve programs during this cycle. The annual reports will also report on results related to PPMs, MTIs and other strategic planning goals and objectives. | $500,000 | ED | $0 |
| Res | All | Program Delivery and Implementation Assessment | Process Evaluation | Process Evaluation of Sempra's Residential Programs | 9 | **Overarching process evaluation of all Sempra's residential programs.** Sempra has proposed to conduct independent process evaluations of the residential retrofit programs included within the SDG&E and SCG portfolios. The primary goal of these studies is to assess the effectiveness of program design, program implementation and marketing activities. The studies will be designed to address process evaluation issues for all residential retrofit programs, including statewide, local and third party. In addition to funding its own independent process evaluations, Sempra plans to provide a limited amount of EM&V funding for process/market studies being managed by PG&E and SCE to the extent that those studies will be collecting data/reporting on baseline metrics, PPMs, MTIs, etc. | $600,000 | IOU | $0 |
| Res | ARP | Program Delivery and Implementation Assessment | Process Evaluation | ARP Early Feedback Evaluation, Process Evaluation and Market Assessment | 10 | **ARP Early Feedback Evaluation, Process Evaluation and Market Assessment.** There are three components of this study: (1) an early feedback evaluation of the ARP retailer trail component, (2) an IOU-led process evaluation of the ARP, and (3) a coordinated market assessment of the ARP and retailer trail components. ED will oversee the IOU management of each of these studies, as well as the coordination with related studies being managed by ED and/or the IOUs.<br><br>Specific goals of the early feedback evaluation include assessing whether or not the retailer trials had the desired outcomes using treatment v. control group analyses. Retailer trials are being conducted in both SCE and PG&E service | $600,000 | IOU | $0 |

| Res/ Nonres/ CC | Pgm/P gm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
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| | | | | | | territories. Feedback is needed by early 2011 in order to incorporate successful elements into the core ARP program. The budget for this component of the study includes a placeholder for ED involvement in study design and analysis of results.<br><br>In addition, the IOUs have proposed to conduct a comprehensive process evaluation of this program, along with an early feedback evaluation of the ARP "retailer trail" program component. The goals of the process evaluation include assessing the effectiveness of program design, including the adequacy of rebate levels and the effectiveness of retailer training activities. The process evaluation will also assess the effectiveness of program marketing, including program benefits messaging, website usability, in-store promotions, outreach to landlords and integration with other IOU and non-IOU programs (e.g., Codes & Standards, HEER, LIEE, WE&T, EPA). The process evaluation will assess program implementation and delivery effectiveness, including evaluating whether or not the program accomplished its targeted and committed outcomes as stated in the Program Implementation Plans (e.g., improved satisfaction with program delivery timelines, program tracking data reliability improvements, etc.).<br><br>In addition, a comprehensive market assessment will also be completed for this program. This assessment will be designed to collect information needed to understand end user preferences, practices, decision criteria, etc. specifically as they relate to usage and disposal patterns for secondary appliances. In addition, the assessment will be designed to understand the structure and operations of appliance disposal and resale markets. Baseline measurements of standard practices for recycling program-qualified appliances will also be researched as part of this assessment. Finally, customer segmentation and emerging technology research will also be conducted to support future program design.<br><br>Because the core ARP program, as well as the "retailer trail" component, have been specifically designed in 2010-2012 to include strategies to reduce free ridership and improve overall realization rates, it will be important that all three of these study components (e.g., early feedback evaluation, process evaluation and market assessment) are highly coordinated with the impact evaluation activities carried out for measures targeted by this program.<br><br>In addition, the PPM for this program calls for measurements of saturation levels for appliances by age, size and efficiency. As such, this study will need to coordinate with the residential saturation study. Data related to this PPM will be collected as part of the residential saturation study, while the analysis and reporting on the PPM measurements will be included in the process evaluation. Finally, overall awareness of the program will also be studied through coordinated research targeting the residential sector as a whole (e.g., general | | | |

| Res/ Nonres/ CC | Pgm/Pgm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
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| | | | | | | population surveys included within the AKA-B measurements study group). | | | |
| Res | BCE, HEER | Program Delivery and Implementation Assessment | Process Evaluation | Comprehensive Process Evaluation and Market Assessment of BCE and HEER Program | 11 | **Comprehensive Process Evaluation and Market Assessment of BCE and HEER Programs.** This study includes research and analysis in support of both the BCE and HEER programs. Given the synergies across these two programs (e.g., market actor participation, marketing and outreach activities, etc.), the overall research effort has been combined into one study.<br><br>A key element of this study involves a process evaluation of both programs. The process evaluation will assess the effectiveness of education and training program components, including retailer education and training initiatives and online consumer training tools designed specifically for BCE. The process evaluation will also address program design effectiveness, including adequacy of incentive levels and the use of upstream, midstream and/or downstream delivery channels. Program marketing and outreach effectiveness will also be evaluated focusing on strategies corporate retailer partnerships, in-store promotions, outreach to sales and service teams, engagement of relevant industry groups and associations, and integration with other IOU and non-IOU programs (e.g., SCE's Online Buyers Guide, ARP, MFEER, Codes & Standards, Emerging Technology, ME&O, WE&T, LIEE, EPA, CEC, "Top Ten USA"). The process evaluation will also include an assessment of program implementation and delivery effectiveness, including accomplishment of program outcomes (e.g., level of retailer participation, POS customer data collection, program responsiveness and timeliness, etc.). Finally, the process evaluation will also focus on the effectiveness of program administration and management processes, including contact management, program documentation, rebate payment and retailer invoicing, etc.<br><br>This study will also include a market assessment component. Surveys will be conducted with market actors, residential consumers as well as business-to-business consumers to address program-specific AKA-B metrics. For the BCE program in particular, this study will include market research to further understanding of the structure and operations of target markets (e.g., market size, market players, product availability, etc.). Funding has been set aside to support ED involvement in this important component of the study. Data to support the measurement of PPMs will also be collected as part of the BCE and HEER market assessment research activities.<br><br>In addition, this study will be coordinated with residential sector saturation and market share tracking studies, providing baseline measurements (i.e., sales and penetration estimates). This study will also coordinate with overarching residential sector studies to provide measurements of AKA-B metrics. Finally, this study will utilize data collected from the overarching potential study, as well as any specific studies focused on plug load potential, and provide | $750,000 | IOU | $150,000 |

| Res/ Nonres/ CC | Pgm/P gm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
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| | | | | | | recommendations for program improvement and future program design. | | | |
| Res | HEES+ | Program Delivery and Implementation Assessment | Process Evaluation | HEES and Related Programs Process Evaluation | 12 | **HEES and Related Programs Process Evaluation.** This study involves research to improve programs designed to provide consumers with information to help them implement energy savings measures, as well as various marketing and outreach activities designed to provide similar information to specific segments and target markets. Specifically, this study will provide process evaluation results for the statewide HEES program, including the new "universal audit tool" program components, as well as local marketing and outreach programs such as SCE's Community Language Energy Outreach (CLEO) program and the Online Buyer's Guide.<br><br>The process evaluation of this group of related programs will include an assessment of program design effectiveness, including evaluating the comprehensiveness and implementation of energy audit recommendations. The process evaluation will include an examination of program delivery and implementation effectiveness, including the accomplishment of targeted and committed outcomes. Program marketing and outreach strategies will be assessed, including multi-language outreach, targeted segment participation (e.g., high-usage), hard-to-reach segment participation, cross-program participation, and messaging and delivery options (e.g., email, flyers, direct mail). The process evaluation will address how well the information provide through these programs was integrated with others IOU and non-IOU programs (i.e., HEER, Whole House, Emerging Technology, WE&T, CSI, AMI, LIEE, EPA, water saving programs, municipal programs, etc.). Budget has been set aside for ED oversight of and involvement in the design of research for assessing integration effectiveness, adoption effectiveness and best practices.<br><br>This study will coordinate with residential sector saturation and market share tracking studies to collect data on penetration rates. AKA-B metric measurements will be collected through coordinated research targeting the residential sector as a whole. | $400,000 | IOU | $44,000 |
| Res | MFEER, CMHP | Program Delivery and Implementation Assessment | Process Evaluation | Process Evaluation of MFEER and CMHP Programs | 13 | **Process Evaluation of MFEER and CMHP Programs.** This study involves the process evaluation of two separate programs, the Multi-family Energy Efficiency Rebate Program and the Comprehensive Mobile Home Program. The process evaluation of each program will focus on program design, delivery and implementation effectiveness, including the apartment audit tool, lead qualification process, maintenance staff training activities, measure and market actor diversification, quality control and participant satisfaction. In addition, the process evaluation will assess the effectiveness of program marketing, including targeted marketing efforts, marketing and outreach campaigns (e.g., telemarketing, field sales, direct mail, elevator announcements, website), and networking activities targeting various trade and industry organizations. The process evaluation will also include an assessment of integration effectiveness, | $300,000 | IOU | $0 |

| Res/ Nonres/ CC | Pgm/Pgm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
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| | | | | | | including coordination with other IOU and non-IOU programs (e.g., codes & standards, WE&T, solar water heating, solar pool heaters, etc.). Finally, the process evaluation will coordinate with other studies (e.g., residential sector saturation and AKA-B measurement studies) to collect data needed to measure PPMs. | | | |
| Res | Whole House | Program Delivery and Implementation Assessment | Process Evaluation | Whole House Process Evaluation and Market Assessment | 14 | **Whole House Market Assessment and Process Evaluation.** This study will include a market assessment and process evaluation for the Whole House Program. The research to be conducted as part of this study should be carried out in phases. The first phase will involve the collection of information needed to establish important baseline measurements and provide early process evaluation feedback. Subsequent phases will include more in-depth study of the program's design, marketing and implementation, as well as best practices and integration effectiveness assessments. This study will be highly coordinated with other studies, including the residential sector potential, impact evaluation and measure cost studies. | $500,000 | IOU | $0 |
| Res | MIDI | Program Delivery and Implementation Assessment | Process Evaluation | Moderate Income Direct Install (MIDI) Program Process Evaluation | 15 | **Moderate Income Direct Install (MIDI) Program Process Evaluation.** This study will include a process evaluation of the MIDI Program. Similar to the research conducted for the Whole House Program, this study will be carried out in phases. The first phase will involve the collection of information needed to establish important baseline measurements and provide early process evaluation feedback. Subsequent phases will include more in-depth study of the program's design, marketing and implementation, as well as best practices and integration effectiveness assessments. This study will be highly coordinated with other studies, including the residential sector potential, impact evaluation and measure cost studies. | $200,000 | IOU | $0 |
| Res | NC | Program Delivery and Implementation Assessment | Process Evaluation | Residential New Construction Process Evaluation and Market Characterization | 16 | **Residential New Construction Market Characterization and Process Evaluation.** This study is a Market Analysis of California's residential new construction market. The study will provide comprehensive market structure and decision making analyses for the manufactured housing market, the new multi-family construction market and the new single family construction market. The study will provide for detailed reporting on key submarkets and market processes, such as HERS raters and energy consultants, building design process, program participation, and appropriate segmentation and characterization of new home buyers.<br><br>For each major sector, the study will include broadly scoped and in-depth market characterizations as well as AKA-B measurement. The studies will also investigate program best practices and program design and implementation improvements. This will include the study of incentive structures, the optimal provision of non-incentive services, as well as strategies in marketing and outreach. Marketing and outreach research will include a close look at potential applications to the SCE Integrated Marketing and Outreach Program. | $350,000 | IOU | $0 |

| Res/ Nonres/ CC | Pgm/Pgm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
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| | | | | | | The studies will further investigate baseline building practices, efficient market share and remaining energy efficiency potential in each market, with a view ultimately to constructing an actionable roadmap for the cost effective achievement of strategic plan goals.<br><br>In addition, this study will provide an update to research conducted 2007-2008 which estimated costs associated with improved efficiency in single family new construction. The update will be in accordance with the final 2008 Title24 code (not available at the time of the original study) and will revise baseline building assumptions by climate zone, as appropriate. | | | |
| Res | OPOWER | Program Delivery and Implementation Assessment | Process Evaluation | Evaluation of PG&E's OPOWER Pilot Program | 32 | **Evaluation of PG&E's OPOWER Pilot Program.** The goals of this study are to validate the methods being used to determine energy savings impacts from comparative energy use programs, including experimental design, sample frames, control group characteristics, random assignment and multivariate data analysis. In addition, the ex-post impact evaluation should be designed to determine energy savings for groups and sub-groups of the samples, as well as assess persistence of energy savings overtime. Cost-effectiveness analyses should also be conducted for different customer groups to inform future program design. [Note: this study is not the ED-managed impact evaluation of this pilot program; ED and its contractors are providing input and oversight to PG&E's initial effort to design the experiment and select the samples. The full-scale evaluation of comparative use programs will be included in the custom impact evaluation scope.] | $350,000 | IOU | $0 |
| Res | All | Energy Consumption, Saturation, and Market Share | Saturation | Residential On-Site/Metering Survey | 47 | This study is a detailed residential on-site baseline survey that includes a large sample of homes. This study utilizes trained surveyors to collect detailed information about the dwelling structure and energy-related equipment and usage characteristics. Options include a detailed plug load sub-study, sub-metering, and over-sampling to capture statistically significant results for new construction, and individual building types. | $2,000,000 | ED | $0 |
| Res | All | Energy Consumption, Saturation, and Market Share | Saturation | Residential Appliance Saturation Survey (RASS) | 48 | The California Residential Appliance Saturation Study (RASS) is primarily a mail survey that involves a sample of over 20,000 homes. This study asks basic questions about dwelling structure and appliance holdings and usage. In addition to appliance saturation estimates, a statistical analysis is performed to develop end use consumption estimates. The 2009 California RASS was completed in mid-2010. Thus, the RASS analysis effort, as a part of the 2010-2012 EM&V plan, will be limited to further data mining of the 2009 RASS data rather than implementation of a new RASS. | $200,000 | ED | $0 |
| Res | All | Energy Consumption, Saturation, and Market Share | Market Share Tracking | Residential Market Share Tracking | 52 | The Residential Market Share Tracking (RMST) study has historically tracked the sales of high efficiency measures (CFLs, HVAC, Appliances (Dishwashers, Clothes Washers, Refrigerators, Room Air Conditioners) by year. The data comes from a variety of sources including retailer point of sales (POS) data purchased from vendors (Lighting), individual retail sales data gathered from a sample of store fronts (Appliances), and distributor sales data (HVAC). This project includes a | $750,000 | ED | $0 |

| Res/ Nonres/ CC | Pgm/P gm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
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| | | | | | | feasibility study to determine the best way to continue the RMST. Possibilities include, but are not limited to, coordinating with the CLASS and RNC studies and/or working with buying groups and building departments to get additional data. | | | |
| Res | All | Market Structure & Decision-making | Market Assessment | Overarching Residential Sector Market Assessment | 55 | **Overarching Residential Sector Market Assessment Study.** The goal of these studies is to provide funding for ED-managed research and analysis designed to address overarching issues, including AKA-B related issues, market characterization, program innovation and opportunity assessments, and standard practice research for programs targeting the residential sector. Similar to the ED-managed overarching process evaluation studies, these studies will draw on primary research conducted as part of other studies but may also include stand-alone research to fill gaps, will provide interim reports as well as more annual and final reports documenting the full effort, and, as appropriate, will report on results related to PPMs, MTIs and other strategic planning goals and objectives. | $300,000 | ED | $0 |
| Res | All | Market Structure & Decision-making | Market Assessment | Consumer Preference Research to Support Lighting Programs | 60 | **Consumer Preference Research to Support Lighting Programs.** This study is being managed by PG&E using 2010-2012 program funds. ED will continue to provide input in the study design, analysis and results reporting. It is expected that the study will provide guidance for key program design considerations including product mix, incentive levels and allocation among distribution channels. | $0 | IOU | $150,000 |
| Res | All | Market Structure & Decision-making | Market Assessment | CEE Energy Star Awareness Survey | 62 | **CEE Energy Star Awareness Survey.** An IOU-funded effort to obtain a CA over-sample from the national CEE Energy Star Awareness Survey. | $0 | IOU | $30,000 |
| Nonres | All | Measure and Program Impacts and Verification | Early EM&V for Non-Residential Custom Projects - ED EM&V Funds | Early EM&V for Non-Residential Custom Projects - ED EM&V Funds | 6 | This study will capture all of the early EM&V activities associated with the Customer Measure impact evaluations. See the write-up above for the Impact Evaluation of Custom Measures. | $2,000,000 | ED | $0 |
| Nonres | All | Program Delivery and Implementation Assessment | Process Evaluation | Overarching Process Evaluation of All Nonresidential Programs | 17 | **Overarching process evaluation of all nonresidential programs.** The goal of this study is to provide funding for ED-managed research and analysis designed to address overarching program delivery and implementation issues, including adoption effectiveness, best practices and integration effectiveness. For the most part, these studies will draw on primary research conducted as part of IOU-led process evaluations, as well as other sources (e.g., market studies, impact studies, etc.). In addition, the scope of this study could include stand-alone research that ED conducts to fill gaps not covered by the IOU-led process evaluations. For example, particular emphasis may be given to areas of strategic interest to the CPUC, including a study of the Onbill Financing Program, the integration of emerging technologies into core nonresidential programs, and cost-effectiveness assessments of different marketing and outreach strategies. This study will produce quarterly reports in an effort to provide more timely | $1,500,000 | ED | $0 |

| Res/ Nonres/ CC | Pgm/P gm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
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| | | | | | | feedback to program planners and portfolio managers. Annual reports and a final report will also be generated, documenting interim findings and actions taken by IOUs to improve programs during this cycle. The annual reports will also report on results related to PPMs, MTIs and other strategic planning goals and objectives. These two studies are: | | | |
| Nonres | All | Program Delivery and Implementation Assessment | Process Evaluation | Process Evaluation of Sempra's Nonresidential Programs | 18 | **Overarching process evaluation of all Sempra's nonresidential programs.** Sempra has proposed to conduct independent process evaluations of the nonresidential retrofit programs included within the SDG&E and SCG portfolios. The primary goal of these studies is to assess the effectiveness of program design, program implementation and marketing activities. The studies will be designed to address process evaluation issues for all nonresidential retrofit programs, including statewide, local and third party. In addition to funding its own independent process evaluations, Sempra plans to provide a limited amount of EM&V funding for process/market studies being managed by PG&E and SCE to the extent that those studies will be collecting data/reporting on baseline metrics, PPMs, MTIs, etc. | $1,000,000 | IOU | $0 |
| Nonres | All | Program Delivery and Implementation Assessment | Process Evaluation | Process Evaluation of Nonresidential Retrofit Programs | 19 | **Process Evaluation of Nonresidential Retrofit Programs.** This study includes a comprehensive process evaluation of all nonresidential retrofit programs, including statewide, local, partnership and third party programs. The goal of the study is to assess the effectiveness of nonresidential retrofit program administration, design, implementation and marketing, with particular emphasis on adoption effectiveness, best practices and integration. Comparisons between and among nonresidential program design, marketing and delivery strategies will be a key element of this process evaluation. In particular, this study will address the effectiveness of different delivery strategies such as the different approaches taken within the nonresidential audit and direct install program components. In addition, the effectiveness of different financial assistance models, including the core calculated v. deemed incentive approaches and, in particular, the On BIll Financing approach. Best practices in program marketing and delivery will also be a focus of this evaluation, including ME&O strategies, project identification/screening processes, and whole building approaches. This evaluation will also include an assessment of benchmarking stategies and recommendations for best practices in this area. It will also be important to assess the effectiveness of nonresidential retrofit programs in integrating with the ETP program. Process evaluations of pilot, new and significantly modified programs (e.g., CEI, RCx, etc.) will also be included in this study. | $1,750,000 | IOU | $0 |
| Nonres | EBCx | Program Delivery and Implementation Assessment | Process Evaluation | Energy Savings Calculation Tools Development for Existing Building Commissioning | 20 | **Energy Savings Calculation Tools Development for Existing Building Commissioning (EBCx) Program.** This study involves the review and development of energy savings calculation tools for common, low-savings EBCx (Existing Building Commissioning) measures. The tools are targeted for use on common measures with relatively low savings, which make up a significant portion of the EBCx measures identified during the 2006-2009 PECI RCx program but a small portion of the overall program savings. The tools are expected to | $0 | IOU | $112,000 |

| Res/ Nonres/ CC | Pgm/Pgm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
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| | | | | (EBCx) Program | | help the program effectively target small to mid size buildings at lower cost, streamlining the participation process and still maintaining a sufficient level of program-wide rigor and consistency. All issues pertinent to the unfolding of these expectations will be investigated thoroughly. Moreover, new savings estimation procedures will be assessed for quality, consistency and effectiveness in both delivery and outcome. | | | |
| Nonres | NC | Program Delivery and Implementation Assessment | Process Evaluation | Nonresidential New Construction Process Evaluation and Market Characterization | 21 | **Nonresidential New Construction Market Characterization and Process Evaluation.** This study will examine the market structure and decision making of the nonresidential new construction market. The study will provide market characterization and AKA-B measurement. It will also provide process evaluation of the Savings by Design program, identifying best practices and investigating new and enhanced program opportunities. Particular attention will be paid to the refinement of marketing and outreach strategies, with a focus on recruiting promising sectors, and improving the training of field representatives.<br><br>This study will characterize baseline building practices, market shares and remaining potential by ownership type and building type. It will leverage and build upon previous research conducted on program penetration and potential that was completed for the years 2004-2009. | $350,000 | IOU | $0 |
| Nonres | All | Program Delivery and Implementation Assessment | Best Practices Assessment | ACEEE "Big Savers" Best Practices Study | 35 | **ACEEE "Big Savers" Best Practices Study.** An IOU funded "best practices" study designed to highlight how market actors have achieved large savings. | $40,000 | IOU | $0 |
| Nonres | All | Energy Consumption, Saturation, and Market Share | Saturation | Industrial Customer Surveys | 49 | There are several possible components of this study. The first involves phone surveys to collect information about presence of end uses, general efficiency levels, and customer awareness, and to validate NAICS coding. The second includes onsite data collection to confirm or adjust MECS end use shares, assess energy efficiency potential, and further validate NAICS codes. Finally, the third involves surveys and audits of the largest industrial customers to develop comprehensive data on industrial facilities, including end use shares, energy efficiency potential, and NAICS code validation. | $450,000 | ED | $0 |
| Nonres | All | Energy Consumption, Saturation, and Market Share | Saturation | Industrial End Use Saturation Study (IEUS, pre 2010-2012) | 50 | The Industrial End Use Saturation Study (IEUS) was initiated several years ago by the IOUs. The project is currently on hold pending resolution of several issues. | $0 | ED | ######## |
| Nonres | All | Energy Consumption, Saturation, and Market Share | Saturation | Commercial Saturation Survey | 51 | The key characteristics of this study are that it utilizes detailed on-site surveys for data collection, has sample sizes large enough to produce statistically significant results for major building types, and integrates building site characteristic data with energy consumption and load shape metering data. The study will provide baseline and longitudinal data for numerous planning, evaluation, and policy purposes. Several options of widely varying costs and scope are under consideration. | $5,000,000 | ED | $0 |

| Res/ Nonres/ CC | Pgm/Pgm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
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| Nonres | All | Energy Consumption, Saturation, and Market Share | Market Share Tracking | Commercial Market Share Tracking | 53 | The Commercial Market Share Tracking (CMST) study will track sales of high efficiency measures installed in non-residential buildings. To keep costs at a minimum, this study will be closely coordinated with the CEUS study. Phone surveys will be used to find non-residential new purchasers of targeted equipment. Self reported sales and efficiencies will be verified with on-site surveys. The budget estimate assumes that 4-6 measure groups will be tracked. | $1,000,000 | ED | $0 |
| Nonres | All | Energy Consumption, Saturation, and Market Share | Market Share Tracking | Industrial and Agricultural Market Share Tracking | 54 | The Industrial/Agricultural Market Share Tracking (CMST) study will track sales of selected high efficiency and standard practice technologies in the industrial and agricultural sectors. | $500,000 | ED | $0 |
| Nonres | All | Market Structure & Decision-making | Market Assessment | Overarching Nonresidential Sector Market Assessment | 56 | **Overarching Nonresidential Sector Market Assessment Study.** The goal of these studies is to provide funding for ED-managed research and analysis designed to address overarching issues, including AKA-B related issues, market characterization, program innovation and opportunity assessments, and standard practice research for programs targeting the nonresidential sector. Similar to the ED-managed overarching process evaluation studies, these studies will draw on primary research conducted as part of other studies but may also include stand-alone research to fill gaps, will provide interim reports as well as more annual and final reports documenting the full effort, and, as appropriate, will report on results related to PPMs, MTIs and other strategic planning goals and objectives. | $300,000 | ED | $0 |
| Nonres | All | Market Structure & Decision-making | Market Assessment | Industrial Sector Market Characterization Study | 57 | **Industrial Sector Market Characterization Study.** The goal of this study is to characterize energy use and energy efficiency in the CA industrial sector. The study will develop and present data on the CA industrial sector, including end use consumption estimates, load shapes, key end uses and measure to target for energy efficiency, and a gap analysis between potential and recent program accomplishments. | $225,000 | IOU | $0 |
| Nonres | All | Market Structure & Decision-making | Market Assessment | Agricultural Sector Market Characterization and Potential Study | 58 | **Agricultural Sector Market Characterization and Potential Study.** This study will be designed to identify opportunities for energy efficiency, demand response and self-generation within the agricultural sector. Components of this study may include a literature review, market and energy usage characterization, a customer needs assessment, gap analysis, saturation and baseline analyses for specific technologies, and a potential study for the most promising opportunities. | $0 | IOU | $400,000 |
| CC | All | Measure and Program Impacts and Verification | Detailed Impact Evaluation of High Impact Measures | Detailed Impact Evaluation of High Impact Measures | 1 | This is comprised of 6-10 individual, very high quality impact evaluations that would focus on a single measure group, but provide reliable results at the program level for key programs or groups of similar programs. Measure groups that contribute a significant amount to all IOU portfolios would be strong candidates for these studies, particularly those which were not evaluated in great detail as part of the '06-08 evaluations. These studies would be developed to provide both precise (90/10) ex post savings results, but also yield useful information for current and future program planning. We would expect a budget in the range of $1 to 2m for each individual measure group study. | $10,000,000 | ED | $0 |

| Res/ Nonres/ CC | Pgm/Pgm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
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| CC | All | Measure and Program Impacts and Verification | Impact Evaluation of Custom Measures | Impact Evaluation of Custom Measures | 2 | There are a number of custom measure groups which contribute a significant amount of savings to the overall portfolio that will be evaluated as part of this study. The savings associated with these measures also typically have very high uncertainty because they are custom measures. These studies can be costly because they require early evaluation efforts to establish baselines (which is budgeted in a separate study listed below), M&V to develop reliable savings estimates, and net-to-gross data collection using professional staff. Please note that the indirect impact programs, such as NRA, CEI, IDSM, ETP, etc., will be classified along with the custom measure studies. We would expect a budget in the range of $250k-$1m per measure group evaluated. | $9,000,000 | ED | $0 |
| CC | All | Measure and Program Impacts and Verification | Impact Evaluation of Strategic Measures | Impact Evaluation of Strategic Measures | 3 | This is comprised of 6-10 individual impact evaluations that will focus on a single measure group. These measure groups have significant future savings potential and/or are key to strategic planning goals. These may not be measure groups that are currently providing significant levels of savings. Also included in these strategic studies could be impact evaluations focused on pilot programs offered by the IOUs, such as the OPOWER Pilot Program. These studies would be more limited in scope ($250-750k each), focused on providing results that can be reliably used for future planning. Results are not necessarily meant to be program-specific to 2010-12 programs, but may be specific to program types for future planning (i.e., direct install versus deemed savings). | $5,000,000 | ED | $0 |
| CC | All | Measure and Program Impacts and Verification | Parameter Focused and Cross-Cutting Impact Evaluations | Parameter Focused and Cross-Cutting Impact Evaluations | 4 | This is comprised of 6-10 individual impact evaluations that will be focused on measure groups that are not listed above, but comprise a significant level of savings. Measure groups in this category are likely to have been studied in the 06-08 cycle and have relatively reliable existing savings values. These studies are likely to focus on parameters (or possibly customer segments) where the greatest uncertainties lie with the existing results. Many of the indoor lighting measures might fall under this category. These studies may also include cross cutting studies that are focused on a single parameter, such as a NTG study, an EUL/RUL study or an HVAC interactive effects study. We would expect these studies to have a wide range of cost depending on how focused the measure/study is, and the measure's contribution to savings (likely in the range of $250-$1m). | $4,500,000 | ED | $0 |
| CC | All | Measure and Program Impacts and Verification | Verification and Ex Ante Review/Update Study for Moderate Impact Measures | Verification and Ex Ante Review/Update Study for Moderate Impact Measures | 5 | The objective of this study is to provide an estimate of ex post savings for a group of measures that comprise enough statewide savings, such that the cumulative savings among measures in all five impact evaluation study categories would comprise at least 80% of the kW, kWh and therm savings claim by the IOUs. At a minimum, this study would provide a combined verification rate and an ex ante review/update for all measures. If there are some "special interest" measures or measure segments, some additional resources may be allocated to those measures to oversample them. | $1,000,000 | ED | $0 |
| CC | Lighting | Measure and Program Impacts and | Parameter Focused and Cross-Cutting | CFL Laboratory Testing | 7 | **CFL Lab Test (Pre 2010-2012 funded).** The CPUC and SCE have co-funded laboratory study to look at CFL lamp life as a function of usage and switching patterns. A sample of 3,600 CFLs, designed to be representative of mix of CFL | $0 | ED/SCE | $760,000 |

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| | | Verification | Impact Evaluations | | | products in the California market and promoted through California IOU programs, was acquired from retail outlets across the state that was. 72 models are represented in this test, 66 of which are Energy Star qualified models.<br><br>In September 2010, a two-year "cycle test" was initiated where the 3,600 CFLs were placed on 10 different timing cycles (360 identical batches in each of the 10 cycles) to look at life characteristics vs switching patterns. The 10 timing cycles ranged from as short as 2 minutes on to as long as 12 hours on. Five samples from of each of the 72 models are on each of the 10 cycles, yielding 360 CFLs per cycle.<br><br>One project objective is to combine results of the laboratory cycle test with logger data from real world applications to get better estimates of actual expected CFL life (as opposed to rated life, which is based on 3 hr cycles). The laboratory study will also be conducting a number of other measurements including lamp lumen output (which will allow for a comparison of rated lumens vs measured lumens), lumen depreciation, CRI, CCT, PF, and Mercury content.<br>Complete results are not expected until late 2012, but some preliminary findings (such as the results of the rapid cycle tests as well as rated vs measured lumen outputs) may be released earlier. | | | |
| CC | Lighting | Program Delivery and Implementation Assessment | Process Evaluation | Lighting Programs Process Evaluation and Market Characterization | 22 | **Lighting Market Characterization and Process Evaluations.** This study includes several components focused on the Upstream Lighting Program, including basic CFLs as well as advanced lighting products. It also addresses the EM&V information needs for the Lighting Market Transformation (LMT) Program.<br><br>This study includes Phase 1 and 2 of the Advanced Lighting Baseline Study being managed by the IOUs. This study includes data mining from the 2006-2008 Upstream Lighting Program impact and process evaluations, as well as additional data collection including the purchase of POS lighting sales data from commercial vendors. As such, this study will be closely coordinated with the residential market share tracking study.<br><br>In addition, this study includes a component designed to characterize the supply-side market for basic and advanced lighting products. This study will build from earlier research conducted by ED and the IOUs, as well as explore new distribution channels as indicated by the LMT Program and Emerging Technologies Program.<br><br>This study also includes a process evaluation component specifically focused on the LMT Program. The process evaluation will assess the success of the lighting | $1,500,000 | TBD | $0 |

| Res/ Nonres/ CC | Pgm/Pgm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
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| | | | | | | technology roadmap in providing insight that that was effectively integrated into program design.<br><br>This study will be highly coordinated with impact evaluations focused on upstream lighting measures. In addition, this study will coordinate with the measure cost study. Finally, this study will be coordinated with AKA-B measurement research to track changes in the underlying lighting market conditions, including upstream, midstream and downstream perspectives. | | | |
| CC | HVAC | Program Delivery and Implementation Assessment | Process Evaluation | HVAC Programs Process Evaluation and Market Characterization | 23 | **HVAC Market Characterization and Process Evaluation.** This study is comprised of several components. First, this study will build from work initiated in 2009 to mine existing data for insight about HVAC maintenance strategies to both inform current program design as well as the need for further research. A follow-up study is also proposed to fund the research recommended through this initial study. This follow-up study will likely include field measurements and laboratory research.<br><br>This study also includes two research components designed to develop deeper understanding of both end-user and market actor awareness, attitudes, wants and needs, and decision-making processes related to HVAC systems and measures. The research will be conducted in phases, with Phase 1 consisting primarily of a literature review and analyses of secondary data and Phase 2 involving primary data collection to fill critical gaps.<br><br>Finally, this study includes an overarching process evaluation of all HVAC programs and subprograms included within the 2010-2012 portfolio. The goals of the process evaluation are to evaluate the effectiveness of marketing strategies and incentives, contractor training and quality assurance, and trade industry networking. In addition, the process evaluation will include research designed to understand purchase decision making behavior and equipment supply and stocking considerations. | $900,000 | TBD | $155,000 |
| CC | LGP | Program Delivery and Implementation Assessment | Process Evaluation | Local Government Partnerships Program Process Evaluations | 24 | **Local Government Partnerships Program Process Evaluation.** This study will include a case study comparison of LGP models operating in different IOU service territories. Research issues will include an assessment of whether or not LG jurisdictions have experienced capacity improvements and/or implemented permanent changes in energy efficiency policies and practices. In addition, this study will assess administrative costs across different program models, and identify factors contributing to success (or lack of success) in integrating with IOU programs. | $300,000 | ED | $0 |
| CC | ME&O | Program Delivery and Implementation | Process Evaluation | ME&O Program Process | 25 | **ME&O Program Process Evaluation.** This study will provide a comprehensive AKA-B study focused on providing a baseline for the measurement of the achievements of new ME&O campaigns. The scope of AKA-B baseline research | $400,000 | IOU | $104,000 |

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| | | Assessment | | Evaluation | | must be consistent with objectives of ME&O campaigns. This work may leverage the 2010 Energy Conservation, Efficiency, and Demand Response Survey (ECEDR). This effort will include data collection spanning major California spoken languages and provide sector and IOU specific analysis results.<br><br>This study also provides an in-depth program delivery and implementation assessment. This assessment will focus on all stages of implementation, including the processes engaged in the design and development of brand and campaign strategies. Moreover it will assess specific AKA-B and adoption effectiveness outcomes resulting from of specific messaging and channel selection.<br><br>Another component of this study will focus on furthering development of evaluation methods that provide consistent and reliable measurement of program effects. As an extension of such research, this study component will identify related evaluation data requirements and program tracking best practices. | | | |
| CC | WET | Program Delivery and Implementation Assessment | Process Evaluation | WET and Related Educational Program Process Evaluations | 26 | **WET and Related Educational Program Process Evaluations.** This study includes in-depth program delivery and implementation assessments of Workforce Education & Training programs. This component will provide rapid feedback to program management for programs in critical early stages of deployment. Evaluation scope will include a overarching effort to assess adoption effectiveness and best practices, leveraging measured outcomes across the full array of program strategies and markets. This component will also develop and refine logic models as needed.<br><br>This study will also have a curriculum development component. This component will provide recommendations, updates and refinements to training curriculum, leveraging the outcome of the statewide WET needs assessment. It will address previously identified recommendations for improvements to elementary school curriculum, as well developing enhancements for application to WET Centergies curriculum.<br><br>This study will include a component focused on the development of optimal evaluation methods, related data requirements, and best practices in program tracking. In addition to developing new methods, and comparing known methods, this component will perform an evaluability assessment for new or unique programs. | $500,000 | IOU | $0 |
| CC | ETP | Program Delivery and Implementation Assessment | Process Evaluation | ETP Process Evaluation and Market Assessment | 27 | **ETP Market Assessment and Process Evaluation.** The ETP evaluation study will include program delivery and implementation assessment, program impact, as well as market structure and decision making elements.<br><br>One focus of this study is to ensure a balance of portfolio efforts during the | $900,000 | ED | $0 |

| Res/ Nonres/ CC | Pgm/Pgm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
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| | | | | | | initial stages of program planning. This will serve to support strategic plan objectives related to the promotion of specific technologies such as advanced HVAC, plug loads, advanced lighting and ZNE technologies. Balance also needs to be preserved between "proven" underutilized technologies with little market traction and "new" advanced technologies that meet Strategic Plan goals. Other key balancing factors include fuel types, end-use applications, and consideration of market potential.<br><br>The program delivery and implementation assessment component includes an update to the 2010-2012 logic models as well as revisions to the program implementation plan and SMART objectives. It will examine closely the screening and selection criteria of candidate technologies, in particular for the Technology Assessments, Scaled Field Placements, Demonstration Showcases and Technology Development Support subprograms. This evaluation will consider the balance and selection process related to the selection of test sites, participants, climate zones and applications. This component of the evaluation also includes updating the ETP database to review tracking data quality and assess whether tracking methods adequately address evaluation and program management data needs. This assessment will confirm consistent naming and numbering conventions have been implemented, among other previously identified improvements.<br><br>The impact evaluation component of this study will be used to evaluate the extent to which the program objectives and key program outcomes have been achieved. In particular the evaluation will determine the degree to which the program contributed to increased measure awareness, market knowledge and reduced performance uncertainties for ETP stakeholders and IOUs' customers. Ultimately, the evaluation will determine if ETP contributed to increased technology supply and market traction and support the advancement of SP Big Bold Goals including ZNE. This evaluation study will also assess the estimated energy savings of the adopted ET measures into the EE portfolio.<br><br>The market assessment component of this study will include a market characterization component focused on the energy efficiency technology market. Among the primary objectives of this effort is the study of market actors and the competitive landscape. Emphasis will also be placed on research needs and the process by which these are articulated and filled. | | | |
| CC | IDSM | Program Delivery and Implementation Assessment | Process Evaluation | "Omnibus" IDSM Program Process Evaluation | 28 | **"Omnibus" IDSM Program Process Evaluation.** This study will include a program implementation and delivery assessment of the IDSM program. Objectives of this component include a review of related program pilots, with a focus on providing timely feedback. This component will include a best practices assessment that compares strategies and outcomes across programs incorporating integrated energy solutions, both within and outside California. | $250,000 | ED | $0 |

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| | | | | | | Market structure and decision making study focused on market actors and market processes central to delivery of integrated solutions. The study will develop new program strategies and identify opportunities that direct program resources toward the most cost effective strategic implementation of integrated solution support. | | | |
| CC | C&S | Program Delivery and Implementation Assessment | Process Evaluation | C&S Market Assessment and Process Evaluation | 29 | **Codes & Standards Market Assessment and Process Evaluation.** This study will provide a comprehensive analysis of the codes and standards markets in California. It will characterize the code compliance market, including documenting standard practices and key market processes in the context of market transformation and programmatic goals.<br><br>This study will also provide a program implementation and delivery assessment for the statewide codes and standards programs. This component will have a best practices assessment that studies strategies, outcomes and lessons learned in other jurisdictions. It will also include an in-depth process evaluation, incorporating a rapid feedback process evaluation for the Compliance Enhancement Sub-Program and the Reach Codes Sub-Program.<br><br>This study will have a methods component to develop and update evaluation methodologies for C&S programs. This will include the enhancement of NOMAD methods and the development of evaluation protocols for new or critical C&S subprograms. For select new or unique program strategies, methods research will focus on evaluability assessments (e.g. C&S data dictionary). Methods research will focus on baseline development and assessing the mechanisms governing market penetration of products governed by codes.<br><br>Finally, this study will include a component focused on lighting. In particular, this study will provide a statewide lighting energy use baseline characterization that covers indoor residential, indoor commercial and outdoor lighting sectors. Key study outcomes include the creation of a model of lighting energy use in California that will support scenario analysis for testing the projected savings of alternative program strategies. From this model, the Codes and Standards Program will be able to identify a code specific pathway to achieving the lighting use reduction goals established in AB 1109. | $500,000 | TBD | $17,200 |
| CC | All | Program Delivery and Implementation Assessment | Process Evaluation | Early EM&V Research for All Programs | 30 | **Early EM&V for All Programs.** This study area will include early EM&V research activities to be conducted by IOUs as a component of improving ongoing program performance (e.g., short turnaround research to support work paper updates). This study area could address research needs for any program, residential or nonresidential. | $500,000 | IOU | $0 |
| CC | ZNE | Program Delivery and Implementation | Process Evaluation | ZNE Market and Process Assessment | 31 | ZNE Market and Process Assessment. This study will define an optimal pathway for the achievement of the CA Strategic Plan ZNE goals. This study will span all relevant sectors, including new construction and existing buildings. This study | $1,400,000 | IOU | $0 |

| Res/ Nonres/ CC | Pgm/Pgm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
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| | | Assessment | | | | will focus on defining the required acceleration of codes and standards stringency, as well as supplemental programs, policies or procedural strategies to ensure successful implementation. In particular, the study will consider expanding Title 20 and 24 to address all significant end uses and determine required improvements in the coordination of code development across local, state, and federal jurisdictions. This study will also provide the timely address of near term concerns, including but not limited to the appropriate treatment cost-effectiveness and compliance in the context of ZNE Standards.<br><br>This study includes a program delivery and implementation assessment component that has an early EM&V planning component. The IOUs will develop a plan to create and utilize ongoing and timely evaluation results to continuously improve integrated program offerings of the ZNE pilot programs. The early planning component will also detail the process evaluation of ZNE pilot programs, and a best practices assessment that will seek to integrate the lessons learned from programs with similar goals and/or designs. It will also propose additional study elements (or sub-studies) identified as critical to the creation of a statewide roadmap to achieve ZNE goals. As the evaluation progresses through the 2010-2012 cycle, additional ZNE strategic support studies will be proposed for the next program cycle (2013-2015).<br><br>This study will include a technical potential element focused on the assessment of building types with respect to their technical potential to achieve net zero-energy in the Commercial Sector.<br><br>This study will include a targeted market structure and decision making component. The focus of this element will be on markets and market processes on the critical path to achieving ZNE goals. This will identify and characterize primary market transformation barriers, and prioritize the need to address those barriers in the context of related costs, benefits and feasibility. Attention will be paid to key market actors and their perspectives within the context of relevant markets and service territories, and to developing ZNE market segmentation and differentiation at the local, sector and statewide level.<br><br>This research will seek new and enhanced program strategies in support of ZNE goals, which will supplement or improve the existing portfolio. This study should be coordinated carefully with related scope addressed in the C&S study, the new construction market studies, the IDSM study, and the ZNE potential, costs and goals sub-study. | | | |
| CC | All | Program Delivery and Implementation Assessment | Process Evaluation | SCE's Enhanced Inspection Study | 33 | **SCE's Enhanced Inspection Study.** Process evaluation study focused on improving SCE's internal QA/QC and inspection procedures | $479,000 | IOU | $0 |

| Res/ Nonres/ CC | Pgm/Pgm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
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| CC | All | Program Delivery and Implementation Assessment | Process Evaluation | SCE's Catalina Island Program Improvement Assessment | 34 | **SCE's Catalina Island Program Improvement Study.** Study focused on gathering data for a pilot effort on how to reach this high-cost-to-serve area. | $0 | IOU | $25,000 |
| CC | All | Program Delivery and Implementation Assessment | Best Practices Assessment | Overarching Best Practices Assessment | 36 | **Overarching Best Practices Assessment.** This study will include a best practices assessment for program-specific intervention strategies, as well as across programs targeting similar markets and/or technologies (may include research outside of CA). The goal for this study is to identify and direct data collection and analysis as part of market, process and impact evaluation studies being conducted for specific markets, programs and measures. | $500,000 | ED | $0 |
| CC | All | Program Delivery and Implementation Assessment | Adoption Effectiveness Assessment | Adoption Effectiveness Assessment | 37 | **Adoption Effectiveness Assessment.** This study will focus on assessing participation/measure adoption levels by customer class, market sector, etc. as well as analysis of the key factors driving participation/measure adoption rates. The goal for this study is to identify and direct data collection and analysis as part of market analysis and process evaluation studies being conducted for specific markets and programs. This study area will also integrate the results of the adoption effectiveness analyses conducted as part of the individual program evaluation studies. | $250,000 | ED | $0 |
| CC | All | Program Delivery and Implementation Assessment | Integration Strategy Assessment | Overarching Study on Integration Effectiveness | 38 | **Overarching Study on Integration Effectiveness.** This study will focus on assessing the effectiveness of integration strategies, including integration of various EE programs, as well as low income, DG and DR. The goal for this study is to identify and direct data collection and analysis as part of market, process and impact evaluation studies being conducted for specific markets, programs and measures. | $250,000 | ED | $0 |
| CC | All | Program and Measure Costs | Program and Measure Costs | Measure Cost Study | 39 | This study will focus on verification and estimation of measure and program costs. Measure costs will be estimated using a variety of primary and secondary research techniques from data collected from program records and the broader market place. Because of the large number and variety of technologies and measures included in utility program filings, no single data collection and analysis strategy is suitable for developing accurate cost data. Instead, different data collection strategies must be appropriately matched to the unique estimation challenges that each technology, measure, and program presents. | $2,000,000 | ED | $0 |
| CC | All | Program and Measure Costs | Program and Measure Costs | Measure Cost Study Data Collection Support | 40 | This study area will focus on capturing cost data collection economies-of-scale through other EM&V studies such as impact evaluation, process evaluation, market studies, and potential studies. These cost data will generally be provided to the primary Measure Cost Study team for analysis, although in some cases the Measure Cost team may direct the other study team to conduct a specific measure cost analysis. | $500,000 | ED | $0 |
| CC | All | Portfolio Strategy and Management Assessment | Portfolio Strategy and Management Assessment | Portfolio Strategy and Management Assessment | 41 | This activity area will address the managerial and strategic aspects of portfolio implementation. Research will focus on management structures, implementation systems, work flow management procedures, expenditure and accomplishment tracking, use of information technology and other performance enhancement tools, staffing and incentives, time allocation and tracking, as well | $3,000,000 | ED | $0 |

| Res/ Nonres/ CC | Pgm/Pgm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
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| | | | | | | as other needs as identified through the EM&V needs assessment process. | | | |
| CC | All | Portfolio Impacts | Portfolio Impacts | Portfolio Impacts | 42 | The portfolio impact area will focus on providing strategic and tactical direction for the data collection and analysis activities in those studies and on integrating and synthesizing the results across measures, programs, and markets. This activity area will also focus on continuous examination of whether there are any remaining high-priority gaps across the individual impact evaluation and market analysis areas. Any priority gaps identified will be addressed through development of additional data collection and analysis activities which will be assigned to the most appropriate impact study or activity area or addressed through the development and implementation of new studies. | $2,000,000 | ED | $0 |
| CC | All | Portfolio Impacts | Market Effects | Market Effects and Transformation Research | 43 | This study area will be responsible for identifying and managing research efforts associated with market effects and market transformation. This research may be exploratory and qualitative in nature and is not intended to be predicated solely on quantification of impacts associated with program and non-program market interventions. Market effects research will likely be conducted as a combination of leveraged data collection and analysis as part of market analysis and program evaluation studies, as well as through stand-alone studies. | $2,500,000 | TBD | $0 |
| CC | All | Portfolio Costs | Portfolio Costs | Portfolio and Program Financial Audit & Analysis | 44 | This activity area will focus on investigating the expenditures allocated for the management and implementation of programs; and costs associated with overall portfolio administration, including general, administrative, and overhead. The portfolio costs study area will conduct a compliance review of the utilities' financial operations, evaluate the overall use of energy efficiency expenditures, and provide recommendations for improving the financial systems and related policies. | $3,000,000 | ED | $0 |
| CC | All | Energy Consumption, Saturation, and Market Share | Macro Consumption | Macro Consumption White Papers | 45 | This study activity will focus on the development of a set of parallel white papers by 3-5 teams of leading economists and researchers that explore and assess a range of alternative, "top-down" evaluation methodologies from a variety of perspectives relevant to the CPUC's needs. The scope of the white papers will include a comprehensive review and assessment of possible top-down evaluation approaches (and other related studies as deemed appropriate) that have been or could be used to assess the load impacts of energy efficiency programs, including identification of meaningful energy intensity, structural, and behavioral indicators for different sectors of utility end-use customers. For each alternative approach, the white papers will assess and describe the pros, cons, and tradeoffs of each including data requirements, time and resource requirements, precision, and sources of uncertainty. Finally, the white papers will also include recommendations for specific top-down evaluation approaches that would appropriately supplement and add value to the CPUC's existing bottom-up EM&V and planning activities and provide a detailed proposal to conduct a pilot study to implement the authors' preferred approach(es) using existing data (including data that could be developed from existing data sources). | $150,000 | ED | $0 |
| CC | All | Energy | Macro | Macro | 46 | Based on the assessments and recommendations provided in the macro- | $500,000 | ED | $0 |

| Res/ Nonres/ CC | Pgm/Pgm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
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| | | Consumption, Saturation, and Market Share | Consumption | Consumption Pilot Studies | | consumption white papers, one to three proposed pilot studies will be chosen for "proof of concept" implementation and demonstration using existing data sources in California. The results of the pilot studies will be evaluated by the Energy Division and stakeholders through a series of public workshops and presentations with respect to the value of EM&V-related information derived from the pilot studies, the relative cost and ease of implementation, and the potential to be expanded and improved using new primary data. These pilot studies will produce recommendations and an assessment of pros and cons of pursuing subsequent full-scale and ongoing studies inclusive of any primary data collection requirements. | | | |
| CC | All | Market Structure & Decision-making | Market Assessment | Building/Facility Renovation/Remodel Rates Study | 59 | **Building/Facility Renovation/Remodel Rates Study.** This study will develop updated estimates of renovation/remodel rates by building type, CZ, and vintage. | $300,000 | IOU | $0 |
| CC | All | Market Structure & Decision-making | AKA-B Metrics and Measurement | Measurement and Reporting on AKA-B Metrics | 61 | **Measurement and Reporting on AKA-B Metrics.** Develop and measure baseline and ongoing AKA-B metrics, overall and for specific segments, reporting on changes over time and key drivers of changes | $250,000 | ED | $0 |
| CC | All | Manage EM&V | Manage EM&V | Manage EM&V (Special Studies, Evaluation Guidelines) | 63 | The activity area will support research focused on improving existing EM&V methods and guidance within the context of cost-effectively meeting the CPUC's goals and objectives for EM&V. | $1,000,000 | ED | $0 |
| CC | All | Manage EM&V | Manage EM&V | EM&V Best Practices Study | 64 | This study will conduct a review of EM&V issues, approaches, and best practices both within and outside the energy-efficiency field. | $200,000 | ED | $0 |
| CC | All | Manage EM&V | Manage EM&V | Evaluation Methods and Procedures Assessment | 65 | This study will entail a review of energy-efficiency program evaluation-related methods and issues by leading evaluators outside of the energy efficiency field. | $200,000 | ED | $0 |
| CC | All | Ex Ante Development and Approval | Ex Ante | Database for Energy Efficiency Resources (DEER) | 66 | Ex-ante estimates will be developed based on best available data and methodologies. Activities include (1) adding new measures, (2) gross and net impact parameter updates, (3) statistical analysis and mining of existing sources to support developing ex ante updates, (4) measure cost analysis and updates, (5) useful life and technical degradation updates, (6) software and documentation upgrades, and (7) coordination with 2010-2012 impact evaluation and cost data collection and analysis activities | $4,000,000 | ED | $0 |
| CC | All | Ex Ante Development and Approval | Ex Ante | Support Ex Ante Development, Review, & Approval (includes non- | 67 | This study area provides technical consulting to support Energy Division's review and approval of IOU ex ante values. IOU filings, work papers, cost effectiveness calculations, and tracking systems will be reviewed to confirm correct use and application of DEER values for DEER measures. For non-DEER measures and parameters, methods, data, sources, and assumptions will be reviewed to assure use of best-available-information. As requested by Energy Division, new or | $2,000,000 | ED | $0 |

| Res/ Nonres/ CC | Pgm/Pgm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
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| | | | | DEER) | | modified methods, data, and sources may developed for non-DEER measures. | | | |
| CC | All | ED Reporting | ED Reporting | ED Reporting | 68 | This activity area will focus on Energy Division's regulatory-related reporting requirements for energy efficiency. This will include data management activities associated with IOU submittals of program accomplishments and all associated tracking and reporting compliance data. It will also include all Energy Division management, analysis, and reporting activities associated with integrating program, portfolio, and market analysis results into regulatory-required reports of overall IOU energy efficiency impacts, costs, and cost effectiveness. | $2,000,000 | ED | $0 |
| CC | All | ED Reporting | ED Reporting | Savings Decay and Cumulative Goals Analysis | 69 | This study will estimate the effect on cumulative goals of measures with short measure lives and concomitantly examine the likelihood of re-adoption of such measures at the end of their initial service life. The results of this analysis will be compared to the current CPUC policy requirements that IOUs must replace 50% of the savings associated with short-lived measures to meet cumulative goals requirements. | $100,000 | ED | $0 |
| CC | All | ED Reporting | ED Reporting | Energy Efficiency Load Forecasting Integration | 70 | This study will continue work on introducing stochastic/probabilistic modeling approaches for EE resources into load forecasting and procurement. It will also continue work efforts to harmonize inputs and methods for CEC load forecast and CPUC Potential and Goals Study. | $250,000 | ED | $0 |
| CC | All | ED Reporting | ED Reporting | Update and Refine Cost-Effectiveness Tools | 71 | This study area will review, assessment, and updating of tools to calculate cost-effectiveness for measures, projects, programs, and portfolios. | $500,000 | ED | $0 |
| CC | All | Develop Goals and PPMs | Goals | EE Goals Integration Study | 72 | The EE Goals Study will incorporate the findings from an updated EE Potential Study, savings estimates associated with reach codes and improvements in code compliance, and leverage information from Market Characterization studies of zero net energy new construction programs in order to develop revised forecasts of potential TMG savings in each IOU service territory. | $500,000 | ED | $0 |
| CC | ZNE | Develop Goals and PPMs | Goals | Zero Net Energy Potential, Costs, and Goals Sub-Study | 73 | This study will focus on improving estimation of the costs, savings, feasibility, and potential adoption of ZNE homes and buildings. This research will coordinate with and integrate results from related ZNE market characterization and roadmap studies. ZNE data and results will be prepared for inclusion in the EE Goals Integration Study. | $250,000 | ED | $0 |
| CC | C&S | Develop Goals and PPMs | Goals | T24/T20 and "Reach Codes" Compliance Study | 74 | This study will develop updated estimates of T24/T20 and "reach code" compliance rates by building type, CZ, and vintage. | $250,000 | ED | $0 |
| CC | All | Develop Goals and PPMs | Goals | Strategic Plan Feasibility and Cost-Effectiveness Study | 75 | This study will assess the feasibility and cost effectiveness of the targets and objectives in the strategic plan. | $250,000 | ED | $0 |

| Res/ Nonres/ CC | Pgm/Pgm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
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| CC | All | Develop Potential and Future Cycle Ex Ante | Potential | Plug Loads Potential Study | 76 | This study will develop forecasts of achievable savings potential from IOU programs targeting plug loads. | $350,000 | ED | $0 |
| CC | NC | Develop Potential and Future Cycle Ex Ante | Potential | New Construction Energy Efficiency Potential | 77 | This study will focus on developing all of the primary data necessary to update forecasts of achievable savings potential from new construction programs | $250,000 | ED | $0 |
| CC | All | Develop Potential and Future Cycle Ex Ante | Potential | Integrated Energy Efficiency Potential Study | 78 | This study will develop comprehensive, updated forecasts of technical, economic, and achievable savings potential from IOU programs and related non-IOU programs and policies | $1,500,000 | ED | $0 |
| CC | All | Develop Potential and Future Cycle Ex Ante | Potential | Customer Adoption Behavior Study | 79 | Potential models often use functions that simulate customer adoption of energy efficiency measures in response to utility program incentives and other interventions. Existing models incorporate recent adoption data in order to calibrate adoption forecasts. However, the fundamental adoption functions and relationships are mostly derived from a limited set of adoption behavior studies that have not recently been updated. Updating adoption functions will help to ensure that the potential study and the savings goals reflect the most accurate and recent data available. The study of customer adoption behavior will use both existing secondary data sources and primary data collection to better characterize the influence of rebates, payback, first cost, and relative equivalence of other product features on customer adoption behavior. | $500,000 | ED | $0 |
| CC | All | Support Strategic Planning and Policy | Strategic Plan | Information and Services to Support Update to CPUC EE Strategic Plan | 80 | This activity area will provide support to the CPUC's Strategic Planning process, as well as support to the overall energy efficiency policy making process. This category of analysis will inform ongoing strategic planning goals and objectives by providing funding for evaluation efforts that may not currently or fully anticipated but will be critical to maintaining continuous forward progress toward meeting these stated goals and objectives. It will include development of the next Strategic Plan and related ED consultant support. | $2,000,000 | ED | $0 |
| CC | All | Support Strategic Planning and Policy | Policy Support | Review and Refine Cost-Effectiveness Methods and Inputs | 81 | This study area will include<br>• Review and assessment of cost-effectiveness metrics and methods<br>• Review and assessment of non-energy benefits inputs into cost-effectiveness metrics<br>• Review and assessment of environmental adder inputs into cost-effectiveness metrics<br>• Review and assessment of avoided cost inputs into cost-effectiveness metrics<br>• Review and assessment of EUL inputs into cost-effectiveness metrics | $500,000 | ED | $0 |
| CC | All | Support Strategic Planning and Policy | Strategic Plan | Other Strategic Plan Support | 82 | This area will be used to conduct targeted studies needed to support the Strategic Plan and inform EE policy making. The latter studies will be those that are not otherwise being conducted in other EM&V activity areas. Areas of direct overlap, particularly those associated with direct evaluation of program impacts | $2,100,000 | ED | $0 |

| Res/ Nonres/ CC | Pgm/P gm Group | Primary EM&V Activity Area (Level 3) | Study Group | Study Name | Xref # | Project Description | 2010-2012 EM&V Project Budget | Study Manager | Pre 2010-2012 Budget |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | and effectiveness, as well as estimation of measure/system impacts and costs, will be conducted in the EM&V activity areas and studies responsible for those topics. | | | |

# *B*

## Map to Table C from April 2010 CPUC EM&V Decision

| EM&V Activity Categories | | Program, Portfolio, & Market Assessment | | | | | | | | Management, Policy & Planning | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Program/Measure EM&V | | | Portfolio Analysis | | | Market Analysis | | Managing EM&V, Compliance, & Reporting | | | Regulatory Planning and Policy Development | | |
| | | Measure and Program Impacts & Verification | Program Delivery and Implementation Assessment | Program and Measure Costs | Portfolio Strategy and Management Assessment | Portfolio Impacts | Portfolio Costs | Energy Consumption, Saturation, Market Share | Market Structure & Decision-making | Manage EM&V | Ex Ante Development and Approval | IOU and ED Reporting | Develop Goals and PPMs | Develop Potential and Future Cycle Ex Ante | Support Strategic Planning |
| **Impact Eval** | **1** | P | | X | | X | X | | | | | | | | |
| **Performance Metric Eval** | **2** | P | X | | | | | X | X | | | | X | | |
| **Process Eval** | **3** | | P | | X | | | | | | | | | | |
| **Market Analysis** | **4** | | | | | | | X | X | | | | | | |
| **Early M&V** | **5** | X | P | | | | | X | X | | | | | | |
| **Strategic Planning** | **6** | | | | | | | | | | | | | | P |
| **Strategic Plan Update Studies** | **7** | | | | | | | | | | | | | | |
| Program Best Practices Update | 7.1 | | | | | | | | | | | | | | P |
| Portfolio Analysis / Market Transformation Indicators | 7.2 | X | | | P | X | | X | X | | | | X | | |
| Pilot Program Evaluations | 7.3 | P | X | X | | | | | | | | | | | |
| Additional Strategic Plan Studies (i.e. Industrial, Lighting, Financing) | 7.4 | | | | | | | | | | | | | | P |
| **Energy Efficiency Potential** | **8** | | | | | | | | | | | | | | |
| EE Potential Study (measure/end use level) | 81 | | | | | | | | | | | | | P | |
| EE Goals for 2013-2015 and Beyond | 8.2 | | | | | | | | | | | | P | | |
| Utility EE Forecasting Model Enhancements | 8.3 | | | | | | | | | | | P | | | |
| CEC-CPUC Load Forecast Coordination | 8.4 | | | | | | | | | | | P | | | |
| New And Existing Bldg. Energy Reduction Potential | 8.5 | | | | | | | | | | | | | P | |
| **Ex-Ante Estimates Development** | **9** | | | | | | | | | | | | | | |
| Ex Ante Parameter Updates (DEER and work papers) | 9.1 | | | | | | | | | | P | | | | |
| Statistical Analyses for Developing ex-ante inputs | 9.2 | | | | | | | | | | P | | | | |
| Deemed Measure Cost Study | 9.3 | | | P | | | | | | | X | | | X | |
| Customized Project Cost Analysis | 9.4 | | | P | | | | | | | X | | | X | |
| Useful Lives &Tech Degradation Studies | 9.5 | P | | | | | | | | | | | | X | |
| **Data Management** | **10** | | | | | | | | | | | | | | |
| Data Management & Quality Assurance Contractor | 10.1 | | | | | | | | | P | | | | | |
| Cost-Effectiveness Methodology Improvement | 10.2 | | | | | | | | | | | P | | | |
| Updates & Maintenance of EE Web Resources (EEGA, CMS, CALMAC etc.) | 10.3 | | | | | | | | | | | P | | | |
| Cost-Effectiveness Tool Development and Study | 10.4 | | | | | | | | | | | P | | | |
| EE tracking and reporting system improvements/EM&V data needs | 10.5 | | | | | | | | | | | P | | | |
| ED Reporting and Regulatory Support | 10.6 | | | | | | | | | | | P | | | |
| **Best Practices and Methodology Improvements** | **11** | | | | | | | | | | | | | | |
| Analysis of Selected North Amercian EM&V Structures | 11.1 | | | | | | | | | P | | | | | |
| Behavioral energy savings estimation methods | 11.2 | P | | | | | | | | | | | | | |
| Methodology development for attribution analysis | 11.3 | P | | | | X | | | | | | | | | |
| Improved statistical analysis processes | 11.4 | X | | | | P | | | | | | | | | |
| **Energy Consumption Surveys** | **12** | | | | | | | | | | | | | | |
| CLASS (Residential Efficiency Saturation Survey) inc submetering | 12.1 | | | | | | | P | | | | | | | |
| CEUS (Commercial End Use Survey inc submeters) | 12.2 | | | | | | | P | | | | | | | |
| IEUS (Industrial End Use Survey) | 12.3 | | | | | | | P | | | | | | | |
| Agriculture &Water Sectors Energy Use Survey | 12.4 | | | | | | | P | | | | | | | |
| Energy Consumption Tracking Pilot | 12.5 | | | | | | | P | | | | | | | |
| Market Share Tracking Study | 12.6 | | | | | | | P | | | | | | | |
| **Portfolio Financial and Management Audits** | **13** | | | | P | | X | | | | | | | | |
| **ED Master Evaluation Contractor Team** | **14** | | | | | | | | | P | | | | | |
| **CPUC staffing funded by EM&V** | **15** | | | | | | | | | P | | | | | |

| KEY | |
|---|---|
| P | Primary Mapping |
| X | Secondary Mapping |