

**CALIFORNIA MEASUREMENT ADVISORY
COUNCIL (CALMAC)**

**PROPOSED 2003 UTILITIES STATEWIDE
CALIFORNIA ENERGY EFFICIENCY PROGRAMS
WORKSHOP**

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POSSIBLE OVER-ARCHING STUDIES

CALMAC WEBSITE MAINTENANCE AND ENHANCEMENT 2003 STATEWIDE EFFORT 2003 EM&V PLAN

Sponsor: Pacific Gas & Electric

Project Description

The proposed project will maintain the current CALMAC website and will enhance its current capabilities to supply more valuable information on CALMAC activities and PGC funded project reports to the industry via the Internet.

Project Approach

Step 1: Regularly update standing site information to keep it current and useful.

Step 2: Work with the CALMAC Website Committee to continually assess the website for issues and/or enhancements that would increase the value of the site for its users. Such enhancements potentially include:

- Incorporation of program type as a search field in the searchable database.
- Developing and submitting for approval, protocols for acceptance and upload of reports from the various third parties that should be submitting reports for the 2003 evaluations. Searching out those reports.
- Improve and enhance links to other sites, adding site resident information on what the other sites have to offer.
- Create and upload electronic files for 38% of reports that do not currently have them so that all reports in the searchable database are available electronically.
- Systematically search prior filings to identify reports that have not been submitted to the site. To date the system is voluntary.

Step 3: Review and upload all files submitted for agendas and minutes as submitted.

Step 5: Maintain and enhance the CALMAC listserv as needed to support CALMAC and MAESTRO intra-group communication and CALMAC announcement capability.

Step 6: Work with the Website Committee, the website host, and the CEC librarian to maintain the report upload system for new reports, making sure the database information is correct.

Step 7: Act as a conduit between CALMAC and the website host to maintain the database, website, and listserv.

Project Strategy

Maintain site information currency and enhance site usefulness.

Key Tasks

(1) maintain website information current, (2) maintain upload and listserv systems (3) identify website issues and repair software to keep site operational, (4) identify, and implement as requested by Website Committee, enhancements to the design, structure and operation of the CALMAC website.

Project Deliverables

(1) A current and operable CALMAC website at all times, (2) A current and operable CALMAC listserv at all times, (3) Timely turnaround on enhancements as they are identified and agreed by the website committee.

Timeline: Start date: 1/1/04; End date: 6/30/05.

SUPPLEMENT TO MASTER CONTRACT FOR COORDINATION

2003 EM&V Plan

Sponsor: Southern California Edison

Introduction

The master contract for coordination is a 2002-funded project that involves monitoring, providing advice, and reviewing all of the evaluation, measurement and verification studies of 2002 energy efficiency programs, both local and statewide. An early step in the project was to develop a database that could be used to efficiently track and review all of the studies. Energy Division staff saw that with a modest expansion in scope, this database could be enhanced and provided to them to use in tracking the programs themselves, as well as their evaluations.

Study Objectives

This supplement to the coordination project will add data fields, data import capability, and report generation capabilities to the project's evaluation tracking database, to make it a program tracking and reporting database. Such a database will significantly reduce the labor time required for Energy Division personnel to monitor and analyze the progress of the 2002 programs and to provide reports and recommendations for CPUC policymakers.

Study Description

- 1) Add to the Master Contract database all the data fields from the Quarterly Report Workbooks that were not already in the database.
- 2) Develop an automated data import capability to copy data from the workbooks into the database.
- 3) Develop some standard calculation capabilities for combining data from the workbooks.
- 4) Develop calculation and formatting capabilities to produce several standard reports from the database.

Study Deliverables

A database with data import, calculation, and reporting software to support, to be provided to CPUC Energy Division staff. .

DEER INTERACTIVE EFFECTS CALCULATOR 2003 EM&V PLAN

Sponsor: San Diego Gas & Electric

Project Description

DEER data has been limited in its use due to several important limitations on its applicability. One of the major limitations is that the DEER data on energy savings for a technology is currently calculated for the application of a single technology, by itself, to a building. The experience of the California utilities and third parties offering programs that provide incentives for energy efficiency improvements to buildings is that most often multiple technologies are adopted in each building. When multiple energy efficiency measures are applied to a building the total energy savings possible is less than the sum of the savings presented in DEER for each technology. Most interactive effects reduce the individual measure savings from 10% to 30% with some interactions resulting in a reduction of more than 50% or less than 10%. It is proposed that a windows application be developed that allows users to perform the standard DEER analysis on a “custom” list of measures to be applied to a DEER building type; the application will provide DEER results for the specified list of measures as applied to the selected DEER building type and location.

Project Approach:

1. The DEER Interactive Effects Calculator technical methodology: The interactive DEER measures results will be calculated by the same methods as the single measure DEER results using “live DOE-2” runs of the DEER prototypes with the selected full list of measures applied. The base case and full measures runs will be done to get total savings for the full set of measures then individual runs will be made to establish the percent of the total savings that is attributable to each measure. All runs will be made with the same prototypes and measure definitions used to create the DEER single measure static data base.
2. The DEER Interactive Effects Calculator software structure: A Windows application will be developed to facilitate the input and storage of project descriptions and results and to manage the performance of the analysis. Project/building inputs will be consistent with the DEER static database prototype level of detail, and its results will also be consistent with the DEER static data base single measure results.

Measures to be analyzed will be selectable based upon building type and location by specifying the measure type and efficiency/tier level. Once the required information is specified, the analysis will be performed with the user being provided with an ongoing progress indicator. Upon completion of the analysis the user will be presented with the results in the form of a document displayed within the application which will also be printable. More detailed analysis results will also be exported to CSV and/or other formatted files for use outside of the application. A variety of “add-on” options will be available for inclusion in the application, such as exporting the results report to Adobe

PDF files, user-specification of summer/winter plus on/off/shoulder peak periods for reporting of measure impacts on a time-of-use period basis.

3. Distribution of the DEER Interactive Effects Calculator: The product will be packaged as a conventional, single-file program installation package that will be distributed (downloadable) free of charge from internet by users.

Key Tasks:

1) Adapt the DEER prototypes and measure calculation software to allow interactive effect runs. 2) Development of a user interface to collect project specifics and present results including limited on-line help. 3) Production of a release version of the package that is downloadable as a single file installer. 4) One year of product support.

Project Deliverable:

A freeware, internet downloadable windows application.

Timeline: Start date: 8/1/03; End date: 12/31/04

HARD-TO-REACH MARKET UPDATE 2003 EM&V PLAN

Utility Sponsor: Southern California Edison

Introduction

In 2001 a statewide Residential Needs Assessment (RNA) study was completed at the directive of CPUC, which focused on the five hard-to-reach groups, primary language other than English, renter, rural, moderate income, and multifamily. A similar study was conducted for small commercial customers in 2001. These studies have proved to be a good starting place for program implementers to help them target their programs to the hard-to-reach markets. Since then, a number of new information sources and needs have surfaced. The proposed study will build on experiences of the program implementers and evaluators in the 2001 and 2002 with HTR groups and provide a new set of information and data for serving HTR groups.

Study Objectives

This study will have the following objectives:

- Update HTR data with Census2000 and any new available saturation data
- Design and recommend program outreach strategies for HTR markets by Program Type

Study Description

The new releases of Census 2000 data offers good data opportunities to utilize and update the HTR market data. For instance, the 2001 RNA study could only provide Census 2000- based proportion of Asian and Hispanic ethnic population at the zipcode level but not that for non-English language as the HTR group. The new releases from the Census2000 data can now be used to update this data with specific language data. Similarly, moderate income target zip code data can be updated using new income information from the Census.

Additionally, experience with using the 2001 RNA study rural zipcode data suggests that program managers need to be provided with additional information to help them better target rural market. The rural zipcode list is based on available list of rural areas as defined by Federal and State grant programs. Some of the questionable cases of zipcodes identified as rural can be checked to confirm or reevaluate them as rural based on the best workable definition available for rural areas by service territories. Another part of this data clean-up process will be to identify point zips from area zips, which can provide added value for program delivery purposes.

The study will provide actionable support tools that will aid in identifying the HTR market. Such tools will include provision of zipcode-based listing of target markets and hard copy full-size maps for these markets. Also, and any new information on HTR

market behavior, attitudes, and consumption patterns will be provided. Such a data is expected to come from new RASS and CEUS saturation studies currently going on.

STATEWIDE ENERGY SAVINGS POTENTIAL STUDY 2003 EM&V PLAN

Sponsor: Pacific Gas & Electric

Study Description:

The proposed project will be conducted to ensure that policymakers and program planners have up-to-date, state-of-the-art information on the available cost-effective energy efficiency potential for energy efficient goods and services in California. The project will be conducted as one or more separate studies. Results from these studies will facilitate policymakers and program planners in designing the most efficient and effective energy efficiency programs and program portfolios for the state. The purposes of this work are to: 1) Extend existing research on energy efficiency as a cost-effective resource in an integrated portfolio; 2) Prepare action plans highlighting the implications of these studies for program designers and implementers for capturing the forecast savings; 3) Continue enhancement and updating of existing studies in the energy efficiency potential series; and, 4) Develop energy efficiency potential estimates for emerging technologies to compliment the existing studies which are focused on the retrofit market. The reserach will assist the Commission, other policymakers and program implementers in making formed decisions on program planning, design and implementation throughout the state.

Evaluation Approach:

4. Input updates and model enhancements: Review existing market potential studies for the commercial, residential, industrial sectors and the overarching summary study. Incorporate the most current data on prices, saturations, avoided costs, etc. Develop updated inputs where existing inputs are outdated or otherwise in need of improvement. Enhance the models to include features relevant to the evolving regulatory environment (e.g., the capability to forecast the effects of dynamic pricing). Update and augment scenario analyses.
5. Emerging Technologies: Identify near-term, and possibly mid-term technologies suitable for inclusion in the existing energy efficiency potential studies. Develop data inputs to model these technologies. Incorporate the emerging technologies forecasts into existing energy efficiency potential studies. Coordinate treatment of emerging technologies with forecasting strategies used in the new construction energy efficiency potential studies.
6. Action Plans: Prepare mini-reports focused on the needs of program planners and implementers, identifying and highlighting specific opportunities for program targeting to capture the potential identified in the forecasts.
7. Portfolio Planning: Expand the existing research on the suitability and benefits of energy efficiency as a cost-effective resource in an integrated portfolio. Extend pilot research on the benefits of energy efficiency as a tool for risk mitigation. Identify and study other benefits (and/or costs) of energy efficiency to ensure and update the cost-effectiveness modules of the energy efficiency potential forecasts as appropriate. Develop new forecasting modules or techniques as appropriate.

Key Tasks:

Collection of secondary data to conduct the market potential studies, analysis of the data to provide market potential results for different sectors, development of emerging technologies forecasts, preparation of action plans, and additional assessment of cost-effectiveness issues related to the overall program portfolio and/or its constituent parts. Hold public workshops as appropriate to obtain public input and disseminate results.

Evaluation Deliverables:

1) Updated market potential studies for each sector, including an overarching summary study; 2) Inclusion of emerging technologies in the energy efficiency potential models and studies; 3) Action plans for program planners and implementers; 4) Updated analyses and reports pertinent to portfolio planning and risk mitigation.

Timeline: Start date: 8/1/03; End date: 12/31/04

NEW CONSTRUCTION SATURATION AND POTENTIAL STUDY SUPPLEMENTAL ANALYSIS 2003 EM&V PLAN

Sponsor: Pacific Gas & Electric

Study Description

The proposed study aims to provide additional information on cost-effective energy savings for the following new construction markets:

- 1) Single-Family New Construction,
- 2) Multi-Family Low Rise New Construction,
- 3) Multi-Family High Rise New Construction,
- 4) Commercial New Construction,
- 5) Industrial New Construction.

Indications are that the budget for the PY 2002 New Construction Saturation and Market Potential Study may be inadequate to fully address all of the issues associated with New Construction. The Industrial New Construction market is becoming a more significant source for energy efficiency savings. The interactions between codes and standards and energy efficiency and the impact on energy efficiency from building commissioning need to be further analyzed. The budget for the PY 2002 Study did not include any funding for the industrial market, analyses of codes and standards impacts and building commissioning impacts. Also, this Study anticipates identifying additional issues or technologies for analyses based on the results from the PY 2002 New Construction Potential Study.

Programs Description

The Statewide New Construction Programs are designed to encourage single family, multi-family, commercial and industrial builders to construct buildings that reduce energy usage through a combination of financial incentives, design assistance and education. The Programs are performance based and no specific measures or equipment are required for participation or qualification.

Study Objectives

- Determine market potential analysis for a comprehensive list of technologies for all five new construction markets.
- Fully analyze the interactions of codes and standards and building commissioning on new construction markets
- Determine which technologies have the greatest potential for cost-effective energy savings.

Study Tasks Description

1. Step 1: Identify technologies and issues either not being covered or inadequately being covered in the PY 2002 New Construction Saturation and Market Potential Study.
2. Step 2: Obtain committee approval of the technology and issue list.
3. Step 3: Recommend and obtain approval from the committee a methodology to address each of the items on the approved list. Some technologies may be able to estimate energy impacts by using simulation models. Others particularly industrial processing may require a literature search or other methods to estimate savings.
4. Step 4: Develop the energy savings estimates for each item on the approved list.
5. Step 5: Integrate the results from this study with the results from the PY 2002 Study. Recommend changes in either program activities or codes and standards based on the results of this Study

Evaluation Deliverables

1) Measure and Issue Identification, 2) Methodology Recommendations and Implementation, 3) Draft Reports, 4) Final Reports

Timeline: Start date: 6/1/04; End date: 3/31/05.

STATEWIDE RESIDENTIAL MARKET SHARE TRACKING STUDY 2003 EM&V PLAN

Sponsor: Southern California Edison

Introduction

The Statewide Residential Market Share Tracking Study (RMST) has completed nearly 4 years of effort in establishing the tracking of market shares of energy efficient residential appliances in California. Much of the residential data collected thus far, dates to as far back as the 2nd half of 1998, establishing a valuable ongoing database, and resource by which to track the acceptance and influx of energy efficiency into the residential market sector.

It is important to note that, since its inception in 1999, the concept and success of the California Statewide Residential Market Share Tracking Study has garnered quite a bit of national interest. In fact, it has sparked so much interest that an effort has been initiated by the Consortium for Energy Efficiency (CEE), as well as other interested groups, to move forward with a nationwide effort to track the market shares of energy efficient appliances and lighting.

The success of the study is extremely important because evaluation of current statewide energy efficiency programs and initiatives requires extensive knowledge of baseline market conditions, and changes relative to that specific baseline over time. In order to assess the success of market transformation efforts, as well as the success of statewide energy efficiency programs, it is necessary to develop a reasonably comprehensive system to track a variety of indicators of market changes that are attributable to these efforts (market effects). While most market behaviors (and behavioral changes) cannot be expressed quantitatively, the trend of market shares of energy efficiency appliances and other measures, over time, is one market effect indicator that is truly measurable, and can be quantified.

Tracking systems (including those specifically tracking market shares) are necessary for program development, program redesign, and broader policy making decisions to:

- 1) To assess the effectiveness of specific programs and intervention strategies, and
- 2) To assess the success of the overall energy efficiency initiative process and determine the need for continued publicly supported interventions at the end of the transition period.

Study Objectives

The 2003 RMST Project will have the following objectives:

1. Collection of Distributor Sales Data
2. Tracking of National Chain and Independent Retail Sales Data
3. Tracking of Residential New Construction Measures

Study Description

To meet the above-mentioned study objectives, the RMST study will be comprised of the following aspects:

1) Collection of Distributor Sales Data

Tracking of Distributor Sales of HVAC and Water Heating Measures

The RMST has developed several important relationships with major equipment distributors serving the California market. This has resulted in valuable California distributor sales data being collected from these firms since late 1998/ early 1999. This component of the RMST project covers distributor sales of central and room air conditioners, heat pumps, indirect-direct evaporative coolers, and evaporative condenser air conditioners.

The following measures are to be tracked as part of the distributor-tracking portion of the 2003 RMST project:

- Central Air Conditioners
- Gas Furnaces
- Heat Pumps

Sample Design and Database Development

The sample design will support the reporting of market shares at both the state and utility levels. After these data are collected, the appropriate weights are applied so that the sample reflects the population of units passing through California distributors.

This collected data will then be entered into an Access/ Excel database that will be used to provide appliance and sales data to the statewide program managers, and other users of the data.

2) Tracking of Retail Sales Data

Tracking Appliance Retail Sales: The majority of retail appliance sales within California are from two primary sources: 1) National appliance retail chains, and 2) Local independent appliance retailers. With this fact in mind, the RMST is actively pursuing appliance sales data, on a continual, ongoing basis from the following primary retail sources:

- National appliance retail chains have been recruited to provide sales data under the auspices of the ENERGY STAR[®] program.
- A large number of smaller independent appliance retailers throughout California have also been recruited to provide valuable sales data to the RMST Study.

Tracking Lighting Point-of-Sales: In the past years, the RMST Study has contracted with various providers of retail lighting data, to receive semi-annually, retail point-of-sales (POS) lamp data. This data includes both national sales data, as well as sales within California. These data from these providers date back to late 1998, and are invaluable in tracking the various market shares of CFL, halogen cycle, and other lamp types.

This past effort to track market shares of lighting measures has been very successful. However, there have been recent events that may make this continued effort no longer practical. One of the more major contributors to the residential lighting sales data, may be opting out as a data provider. We will continue to work with the national effort (led by CEE) for tracking lighting sales, but ultimately, the continued tracking of lighting measures in California will be undergoing a major reassessment over the next few months.

In addition to the above lighting sales data, the following residential energy efficient measures are also being tracked as part of the retail-tracking portion of this project:

- Room Air Conditioners
- Clothes Washers
- Dishwashers
- Refrigerators
- Compact Fluorescent Lamps

Sample Design and Database Development

The sample of data providing retailers (both ENERGY STAR and non-ENERGY STAR retailers) will support the market-share reporting of data at both the state level, and the utility level.

In addition, this equipment data collected from the retailers will be placed into an Access database. The resulting data, along with any available equipment types and model numbers, will then be translated into pertinent efficiency and size data, before being incorporated into the current database. The resulting database contains sales data as far back as late 1998.

3) Tracking New Construction Measures

New Construction Detailed Energy Audits

In the beginning, the RMST had planned to track energy efficient measures incorporated into residential new construction by performing annual detailed audits of 800 newly constructed homes per year. This was to include both single-family homes, and multifamily buildings throughout California. This effort was performed during the first two years of the project, resulting in a database of 1600 newly constructed residential homes that were constructed from June 1998, through June of 2000.

The first year effort included 800 homes built from July 1998 through June 1999. The second year of this study included another 800 homes built from July 1999 through June 2000. These comprehensive, well-detailed audits tracked the installations of shell measures, space conditioning, appliances, and lighting products in California's residential new construction sector.

This effort provided a great insight into residential new construction energy efficiency, but it did so at great expense. Due to budgeting and funding concerns, as well as changing standards/phasing in of newer standards in Residential new construction standards, this effort was eliminated after July 2000.

Although there is no funding planned this year, for the RMST to complete residential new construction audits, there are other avenues. The RMST has a current effort under way to attempt to utilize new residential construction audit data from other statewide studies to simulate our past efforts in this area. If successful, we hope to utilize this data to our advantage and incorporate this newer data from these studies into the results from previous RMST audits, which should result in a more updated, as well as robust residential new construction database.

New Construction Installation Forms

Although the RMST study has no formal new residential construction on-site survey efforts scheduled this year (above), the RMST has been attempting to collect data from other more cost effective sources. One effort is the collection of state mandated CF6-R forms. The state mandates that certain energy efficient measures be recorded on these CF6-R forms, and be filed in county records.

The RMST study has been collecting CF-6R forms from several local building departments and contractors throughout California, for several years. While this effort has been fruitful, the effort has been met with mixed results, as there is no minimum time requirement for the retention of these forms. As these CF-6R forms do contain a great deal of information regarding energy efficient measures installed within the newly constructed homes, and the RMST will continue to promote this effort to gather this information.

On the positive side, through this effort, strong relationships have been developed and to date, thousands of CF-6R installation forms, as well as much valuable information, have been obtained from various building departments and contractors throughout the state.

Tracking of New Construction Measures

Should we be successful in gathering data from other statewide studies, the following measures will be tracked as part of a new construction portion of this project:

- Duct Sealing
- Central Air Conditioners
- Compact Fluorescent Fixtures
- Windows
- Compact Fluorescent Lamps
- Gas Furnaces
- Dishwashers

Sample Design, Implementation, Weighting, and Database Development

In the past, the *on-site* surveys were conducted annually with sample size designed to achieve a 90 percent level of confidence with a 10 percent *relative error*. These surveys were well-detailed regarding the efficiency levels of the targeted appliances, etc., and are staged at regular intervals over the course of the project. The sample was stratified by the various residence types (single family residences, and smaller multifamily residences), and also by climate zone so that market share trends could be tracked by these variables. In general, the on-site survey data collected was then translated into efficiency and size data, and recorded into the RMST database. Data from all previous on-site surveys have been placed into the RMST database

Study Deliverables

The 2003 RMST Study will produce several semi-annual reports that establish the changing levels of sales of energy efficient residential measures within the state of California. This information should help to establish the impact of residential energy efficient measures, and should provide clear direction and information for policy and operational decisions to individual utilities, policy makers, program implementers, and other stakeholders.

The reports produced will be in the form of two (2) separate formats:

- 1) Full Report: Typically 30 to 40 pages with much detailed information.
- 2) Executive Summary: Essentially a smaller 4 to 8 page version of the full report, in color, with the data summarized, and highlights of the full report.

The following are the expected deliverables from the RMST Project:

- A semi-annual distributor sales tracking report (30 to 40 pages) detailing HVAC- related sales within California
- A semi-annual distributor sales tracking executive summary report (4 to 8 pages). Essentially a summary document, in color, of the full report above.
- A semi-annual retail sales tracking report (30 to 40 pages), detailing retail appliance sales within the state of California.
- A semi-annual retail sales tracking executive summary report (4 to 8 pages). Essentially a summary document, in color, of the full report above.
- A semi-annual lighting retail sales tracking report (30 to 40 pages), detailing retail lighting sales within the state of California.
- A semi-annual lighting retail sales tracking executive summary report (4 to 8 pages). Essentially a summary document, in color, of the full report above.

BEST PRACTICES ENERGY EFFICIENCY PROGRAM 2003 EM&V PLAN

Sponsor: Pacific Gas & Electric

Introduction

There are many ways to judge the success of energy efficiency programs. For newcomers, bringing an innovative approach to energy efficiency is an important indicator. For some stakeholders, increasing partnership and collaboration is an indicator. From a utility perspective, cost effective integration of programs at a portfolio level might be the single most important indicator. From a regulatory point of view, enhancing the design, implementation, and management of public goods charge (PGC) energy efficiency programs could be the most important indicator of success for Californians.

The 2002 Best Practices Study aimed to employ benchmarking to find some of the best practices from nationally recognized experts, and from newcomers and knowledgeable practitioners that designed and implemented energy efficiency programs in California. The implications of this study's findings are that program designers and implementers would be able to reference the Study's outcome and apply the information toward developing more successful energy efficiency programs.

Based on input from Californian practitioners and the study sponsors, the 2003 EM&V Study for the Best Practices Energy Efficiency Program will build upon the 2002 Study's planning and analysis efforts. The 2003 Study aims to:

- Expand on the 2002 data collection and documentation of practices and lessons-learned in the residential, nonresidential and new construction program design sectors.
- Expand the usability of the best practices database that was planned for in the 2002 study. This will include development of the information technology structure to launch the Best-Practices Database and Web page will most useful as a resource and tool for users of the data and information.
- The 2003 study will explore what is the best tool to develop and disseminate the Best Practices information, e.g., upload a searchable, relational database including the benchmarking results and program profiles that will incorporate case study writ-ups, etc.

Study Objectives

The 2003 EM&V Study for Best Practices Energy Efficiency Programs will have the following objectives:

- Expand the number of programs benchmarked
- Address new program categories
- Increase the depth of program components with respect to user needs not covered adequately in the 2002 Study.

- Customize products and tools more to the needs of specific types of users.
- Conduct intensive user needs assessments focused on the website tool capabilities and features
- Assess the IT requirements
- Develop the website/database to have the ability to allow drill down to primary source documentation, e.g. procedures, manuals, marketing collateral, etc.
- Develop costs for maintaining functional links to source documents.

Study Description

The EM&V study will be comprised of the following aspects:

1. Implementation Improvements and Monitoring Results – this step is the most important part in benchmarking. Frequent communications with all end-users will begin to report the progress of the benchmarking efforts.
2. User Behavior Analyses -This phase shall build on traditional EM&V studies approach to track user behaviors and energy efficient practices in response to best practices program database and website. Design features for this Phase may include awareness tracking, assessing implementation effectiveness, behavior tracking studies, decision-maker analyses, etc. This approach assesses the effectiveness of the study approach in delivering user satisfaction. These activities will include process evaluations of the best practice database delivery. User satisfaction surveys regarding user' perceptions on how the various best practices components and programs has helped them design better energy efficiency programs will be verified.

Study Deliverables

The 2003 EM&V study will produce a report that not only establishes benefits of benchmarking best practice energy efficiency programs across the nation but also provides clear information for policy and operational decisions to individual utilities, policy makers, the program designers, implementers, other stakeholders and interested parties.

SCOPE OF WORK FOR EM&V DATA INTEGRATION PROJECT 2003 EM&V PLAN

Sponsor: Southern California Edison

Introduction.

For 2002 and 2003 (and earlier), the CPUC has directed that a number of studies collect data in a variety of ways that potentially could cause confusion and inefficiency if not coordinated. For example, several studies are developing “program categorizations” that may be useful for the scope and nature of the particular investigation, but may not interweave well enough to enable the results to be easily combined and blended. One study may collect information of the cost and energy savings of a measure, but the list of measures may not match the list of measures in another study of persistence of savings.

The EM&V Data Integration Project will seek to coordinate the conceptualizations in the studies to provide more integrated data. Special attention shall be paid to developing data that will usefully feed into the web-based Groupware Application being developed for use by the Energy Division for reviewing program proposals and results in electronic format.

Study Objectives.

The EM&V Data Integration Project will have the following objectives:

- review the scope of work for each PY2002 and PY2003 EM&V project;
- develop a list of data issues for each project, focusing more on *characteristics* of the data rather than the content (e.g., categories; frequency of collection; precision of the measurement; source).
- recommend choices to project teams that will lead to data that can be more easily integrated at the end of each EM&V research project, especially interfacing with the Groupware Application.
- recommend project modifications, if warranted, to EM&V project planners.

Study Description.

To accomplish these objectives, the study will consist of an examination of project data collection plans and instruments, interaction with project advisory teams, and recommendations to individual teams and to CALMAC.

- Examine Data Collection Plans and Instruments

The Contractor shall review project implementation plans for EM&V projects in PY2002 and PY2003. Projects will be selected on the basis of likelihood of overlap with other data collection efforts. The focus will be on data collected by PGC-funded projects in California, but other related research should be considered. The results from these

analyses will be used to develop a mapping of the data being collected and the areas of overlap.

- Interact with Project Advisory Teams

The idea for this project grew from the frustration of not knowing what answers other research teams were reaching for similar questions. For example, the Best Practices project and the Market Potential study both are attempting to group “energy efficiency programs” into useful but manageable categories. The integration of the results of those two studies will be abetted by using comparable program categories. The likelihood of using the same categories improves if there is overlap in the advisory teams *during* the project, with sufficient resources to conduct comparative analyses. The Contractor will provide that overlap and perform those analyses.

The Contractor will attend project meetings, interview team members, review draft documents and other relevant documents (e.g., ordering paragraphs in decisions, relevant research elsewhere in the nation), and provide oral and written comments and recommendations. Project managers are not required to act on the comments and recommendations, but it is expected that knowledge of the parallel efforts will improve the integration of the data resulting from the selected studies, and that the results of next round of research will be even better integrated.

- Recommend Guidelines for EM&V Projects and for Project Planning for PY2004

Based on the experiences with the various project management teams, the Contractor will:

- Develop recommendations regarding how best to integrate the PY2002 and PY2003 data being collected into the Energy Division’s Groupware Application;
- Develop recommendations regarding the design of the next round of EM&V data-collection studies with the goal of better integration of the data;
- Facilitate a discussion at a CALMAC workshop on these findings; and
- Write a report to CALMAC on the recommendations, incorporating any additional useful recommendations from the workshop.

Study Deliverables.

The study shall produce a report to CALMAC on the recommendations for how best to feed data into the Groupware Application, and for the design of the next round of EM&V data-collection studies to improve the integration of the data.

POSSIBLE UTILITY STATEWIDE STUDIES

SINGLE-FAMILY ENERGY EFFICIENCY REBATES 2003 EM&V PLAN

Sponsor: Pacific Gas & Electric

Introduction

The Single Family Home Energy Efficiency Rebates (HEER) Program is a statewide program, administered by the four California investor-owned utilities (IOUs), which provides rebates on various home improvement products including windows, insulation, heating, ventilation and cooling equipment, appliances, and residential pool equipment. The program is in its second year of operation.

The 2003 evaluation will build upon the evaluation of the PY2002 program and address program changes from 2002 that include:

- Changes in rebate levels and program measure mix, such as, the addition of programmable thermostats instant rebates at the point-of purchase (POP) and residential pool pumps.
- Collecting and tracking ongoing program efforts to improve program delivery during 2003 implementation.
- Enhancements on longitudinal study given lessons learned from the CEC's Customer Behavior Study and the Customer Behavior and Attitude component of the 2002 Single-Family Study.

Study Objectives

The 2003 EM&V Study for the Single-Family Energy Efficiency Program has the following objectives:

- Assess the Single-Family Program's efforts to provide helpful information, services, and financing and prescriptive rebates to help move the market to install energy efficient measures in addition to verifying long-term peak demand and energy savings goals of the program.
- Assess the efficacy of POP instant rebates as a delivery strategy for key program measures.
- Verify achieved levels of energy and peak demand savings.
- Provide ongoing feedback and corrective guidance regarding program implementation.

Evaluation Approach

To meet the above-mentioned study objectives, the 2003 EM&V evaluation will continue to focus on verification and behavioral and program changes implemented in 2003.

1. Verification of Program Savings:

This task shall include verification of measure installations and shall combine this data with ex-ante measure savings assumptions to estimate program savings. Energy savings

achieved by the programs are based on *ex ante* assumptions. Data for this Phase may be collected via phone surveys and/or on-site verifications with an appropriate sample design to ensure statistically valid results. All relevant parameters (*e.g.*, net-to-gross, EUL, per unit energy savings, hours of operation) for all measures in the program are detailed in each of the IOU's cost-effectiveness work papers. These parameters will not change during the analysis – the stipulated values are deemed appropriate to verify program savings. These assumptions will be used to determine energy and demand savings based on the number of verified installations in the program year.

2). Customer Behavior Analyses:

This task shall continue to build on longitudinal tracking of customers' behavior and practices obtain from previous studies conducted by the IOUs in order to continue to track customer behaviors and energy efficient practices in response to energy efficiency messages and programs offered through the Single Family Home Energy Efficiency Rebates Program. The Consultant shall leverage survey and study design features from previous statewide and utility specific studies such as, the 2002 Single-Family Study, the Statewide California Lighting and Appliance Program Evaluations, PG&E's 1-2-3 Cashback Customer Behavior study, as well as the current CEC Customer Behavior and Awareness study. Design features for this Phase may include advertising awareness tracking, assessing training effectiveness, behavior tracking studies, decision-maker analyses, etc.

Study Deliverables

The 2003 EM&V study will produce a report that not only establishes energy impact achievements of the program but also provides clear information for policy and operational decisions to individual utilities, policy makers, the program implementers, and other stakeholders. The study will also increase the body of knowledge regarding the use of POP instant rebates as a delivery strategy. It will also help the longitudinal understanding of how customers change their behaviors and adoption of the program measures in response to program implementations.

MULTIFAMILY ENERGY EFFICIENCY REBATE PROGRAM 2003 EM&V Plan

Sponsor: San Diego Gas & Electric

Introduction

The statewide PY2003 Multi-Family Energy Efficient Rebate Program is in its second year. The evaluation will therefore be able to build upon the evaluation of the PY2002 program. Program changes from 2002 that will be included in the 2003 evaluation include increases and/or decreases in rebate levels and the addition and/or deletion of certain measures. Additionally, the PY2003 Program will incorporate a reservation system to assist in the control and systematic distribution of program funding.

Study Objectives

The 2003 EM&V Study for the Multi-Family Energy Efficient Rebate Program will have the following objectives:

- Verify the number of measures installed in program year 2003
- Verify the achievements in the Hard-to-Reach markets
- Measure customer behavior and response for both the HTR and non-HTR customers
- Analyze program efficiency
- Determine the *ex post* energy savings for the measures in the program

Study Description

To meet the objectives listed above and to build upon the 2002 evaluation, measurement and verification work for this program, this study will be comprised of the following aspects.

1) Verification of Installed Units:

This verification will include a validation of each IOU's tracking database. A statistically valid sample of 2003 program participants for each utility will be traced from the initial request, data input to the tracking database, installation verification, and payment of the appropriate rebate level. The program's *ex ante* annual energy savings per measure times the verified number of installed measures will form the basis of overall energy and peak demand savings achieved by the 2003 Multi-Family Energy Efficient Rebate Program.

2) Verification of the Hard-to-Reach Achievements:

This program faces the market barrier of split incentives between owners/landlords and tenants. The owner/landlord is generally not responsible for paying energy bills and therefore has little incentive to install energy efficiency measures. While this program is designed to overcome that market barrier, it plans to target campaigns at zip code

communities with HTR populations and utilize local ethnic, trade, community, and/or apartment associations to help in marketing and outreach efforts. This study will quantitatively and qualitatively verify those efforts and provide on-going feedback to program implementers to enhance the program's performance.

3) Measure customer behavior and response for both the HTR and non-HTR customers

Customer surveys, decision-maker interviews, and advertising awareness for both the HTR and non-HTR markets will be undertaken. The research questions to answer are: is the message being heard and understood? What percentage of eligible customers are participating in the program? What are the reasons customers choose to participate or not to participate?

4) Analyze program efficiency

The PY2003 Multi-Family Energy Efficient Rebate Program incorporated a reservation system to assist in the control and systematic distribution of program funding; the PY2002 program did not have this feature. A comparison of the 2 program years to determine the pros and cons of the reservation system will be undertaken. The 2002 EM&V activities will provide feedback to the program implementers on elements of the program that can be improved to enhance the program's performance. In 2003, follow-up interviews will be conducted with program implementers to assess the resulting changes and their impact on program operation.

5) Determine the *ex post* energy savings for the measures in the program

All relevant parameters for each energy efficiency measure savings estimate (*e.g.*, net-to-gross, EUL, per unit energy savings, hours of operation) for all measures in the program are detailed in each of the IOU's cost-effectiveness workpapers. A special focus will be given to the gas measures, particularly the boiler controllers. One of the aspects that will be focused on will be on determining any kW and kWh savings associated with gas related measures. This study will independently validate these assumptions, through literature research, installation of loggers, interval metering, building simulation, billing analysis, economic modeling, statistical analysis and/or other *ex post* methodologies. Updates to any of these parameters will be coordinated for inclusion in the Deemed Savings Database.

Study Deliverables

The 2003 EM&V study is expected to produce a final report that establishes the most reliable available estimates of gross and net energy savings achieved by the PY2003 Multi-Family Energy Efficient Rebate Program. In addition, the process evaluation and Hard-to-Reach markets analysis sections will provide clear information for policy and operational decisions to individual utilities, policy makers, the program implementers, and other stakeholders.

STATEWIDE HOME ENERGY EFFICIENCY SURVEY PROGRAM 2003 EM&V PLAN

Project Sponsor: Southern California Edison Company

Introduction

The Statewide Home Energy Efficiency Survey (HEES) Program involves the use of two energy survey types (Mail-in and On-line) to increase homeowner awareness of energy efficiency opportunities in order to achieve energy and cost savings. The fact that the energy surveys differ in their delivery mechanisms reflects the belief that customers vary in what they perceive as credible or find convenient when seeking to assess and reduce their energy use at home. The goals of offering and marketing different types of energy surveys are to insure customer equity (providing opportunity for an energy survey to any utility customer who might benefit) and to recognize that customers have unique sets of needs that may make one type of survey more appealing or feasible than another. Recently, there has been an interest in moving toward offering a greater number of On-line surveys because of the cost efficiencies inherent to using this format. However, given that limited customer information pertaining to the On-line survey has been collected in terms of satisfaction with the survey, the extent and ease of use, and the effectiveness of this survey type in terms of providing adequate energy efficiency recommendations, the decision to place a greater emphasis on this type of survey may be premature. In contrast, previous evaluations have yielded a significant amount of information about the Mail-in survey format including adoption rates of energy efficiency recommendations, estimated savings that result from implementing these recommendations, customer satisfaction and use amongst different customer groups.

Accordingly, this evaluation study entails an assessment of the On-line survey to obtain the necessary customer information needed to evaluate the effectiveness of this survey type and the current formats used to offer the On-line survey and the resultant implications for evaluability, ease of use, and quality of energy efficiency information provided to customers. The information obtained in this evaluation can then be used in conjunction with information gathered from previous evaluations of the HEES Program (particularly, the Mail-In survey) to provide an assessment of the different options for offering energy efficiency surveys to varied customer groups.

Study Objectives

The objectives of the 2003 EM&V Study of the HEES Program are:

- Verify and document program accomplishments for both the Mail-In and Online Survey programs.
- Conduct an assessment of the On-line Survey format to obtain relevant customer and use information including but not limited to: the ease and ability to navigate the site, click patterns, comparison of the different On-line models employed, and

- penetration of computers in households and/or access to the Internet and willingness to use computers for transactions.
- Conduct a survey of a sample of customers (which may include participants and non-participants) to assess the barriers to participation for both the On-line and Mail-In Survey programs.
 - Update recommendations for the best strategies to improve program design and to reach customers, including underserved populations.

Study Description

The PY2003 HEES Program evaluation entails the following activities:

1) Verification and Documentation of Program Accomplishments

Program data on the number of energy surveys completed by survey type will be collected and reviewed to verify and document 2003 program accomplishments including the achievement of hard-to-reach goals.

2) Assessment of On-line Survey Format and Survey Options Offered to Varied Customer Groups

This aspect of the evaluation will examine (as information permits): a) the On-line survey including ease of use, ability to navigate the site, and customer click patterns; b) the formats used to offer the On-line survey as it relates (primarily) to information collected by the survey programs and the resultant implications in terms of evaluability and quality of information provided by format; and, c) the trade-offs between offering the Mail-In and On-line surveys, with particular emphasis on quality of information offered, levels of participation, and the effectiveness of reaching different customer segments. Information will be collected on the different On-line survey formats offered by the utilities and used in conjunction with information from previous evaluations of the HEES program to complete an assessment of the different types of surveys used to reach varied customer groups.

3) Assessment of Barriers to Participation

A survey will be conducted of the general customer population, which may include previous program participants and non-participants, in order to assess awareness and barriers to participation for the HEES program, as well as customer willingness to use the Internet and respond to different marketing tools such as direct mail, email blasts, and promotions offering rewards. Supplemental information will be obtained by reviewing existing studies to gather relevant data on penetration of computers in homes and/or access to the Internet as well as to assess customers' willingness to use the Internet for transactions. These data will be used to further characterize those who participate versus those who do not participate, and identify whether there are barriers to participation such as difficulty of use or lack of Internet access. These data will also aid in making an overall assessment of options for offering various types of survey options to customers or using different marketing strategies to reach customers, especially underserved or hard-to-reach customer segments.

4) Follow-up Assessment of Best Practices, Program Marketing, and Outreach Strategies

Updated recommendations regarding best practices will be provided to develop a more refined approach for improving the program design and for developing marketing strategies to improve program participation amongst different customer groups.

REFRIGERATOR RECYCLING PROGRAM

2003 EM&V Plan

Sponsor: Southern California Edison

Introduction

The statewide refrigerator recycling program is in its second year in 2003. The evaluation will therefore be able to build upon the evaluation of the 2002 program.

Study Objectives

The 2003 EM&V Study for the Refrigerator Recycling Program will have the following objectives:

- Verify the number of units recycled in program year 2003
- Improve the robustness of energy savings estimates of the program
- Assess program penetration
- Assess needed process changes as a follow-up to the 2002 process evaluation

Study Description

To meet the objectives listed above and to build upon the 2002 evaluation, measurement and verification work for this program, this study will be comprised of the following aspects.

1) Verification of program goal achievement:

The verification component of this EM&V plan involves several cross-checking tasks to validate the statewide program claimed achievement in terms of savings and number of units recycled across utility territories and Hard-to-Reach (HTR) categories. The work will include verification through review of the tracking database and a follow-up survey of program participants.

2) Determine Robustness of Energy Savings Estimates:

Studies in California to date have used metering and modeling methodologies to arrive at savings estimates for the program. Short-term metering of samples of picked-up appliances measure consumption of the program appliances. Both laboratory metering and on-site metering are intended to mimic “as operated” conditions. Laboratory metering has used controlled settings as specified by United States Department of Energy (DOE) protocols, whereas on-site metering tries to measure individual, highly varying in-situ operating conditions. In the 2002 EM&V evaluation, KEMA-XENERGY reviewed findings from nine studies completed between 1992 and March 2003 in order to understand the nature of the relationship between lab metering and on-site metering results. The literature review came back with the following findings:

- A consistent difference between lab and on-site metering results has not been found. Most studies have found differences ranging from 0 to 15%; a just-published study found modeled results based on laboratory tests 80% higher than on-site metering results for a sample of 40 units.
- Average unit energy consumption in various studies has ranged from 1,000 to 2,600 kWh per year for refrigerators.

While these studies have explored the differences in results between lab and in situ metering, most have not been able to effectively address the question of which approach provided better estimates of actual average usage. Perhaps this is so because monitoring the use of refrigerators is a complicated issue itself.¹ Both types of metering methodologies have inherent limitations. Hence, careful and explicit monitoring and simulation protocols are needed.

The current preponderance of evidence is that the DOE test may modestly over-predict average usage. To go beyond this general result, a very large study of representative samples of both new and old refrigerators in a representative mix of climate conditions and refrigerator placement conditions is needed to develop a more definitive answer. Such a study could be done for California or for the nation, and it would be a reasonable test for DOE to undertake. The cost of doing such a study is far higher than the budget available for the evaluation of this program.

Recent refrigerator program studies have not focused on another commonly used and often-advocated approach to estimating the actual energy usage of major residential appliances: econometric analysis using metered total household energy use data customer billing data and other information about household energy use.

Another question that has been raised is about the average level of degradation of refrigerator energy performance as the units age. An estimate of the change over time can be made by comparing results from the same test procedure used on particular refrigerator models at different ages of the refrigerators.

Given the extremely limited budget available for market assessment and program evaluation studies in 2003, this study opts for the following activities.

1) A regression analysis will be developed to compare metering-based modeled estimates of Unit Energy Consumption (UEC) of refrigerators to actually observed household consumption changes. In 2003, the robustness of the recycling program unit savings estimates can be tested by applying the 2002 metering-based model to the 2003 program units to produce modeled unit energy consumption. These modeled UECs will then be used in a statistically-adjusted engineering analysis using pre- and post-removal

¹ Cavallo, James, and James Mapp, "Monitoring Refrigerator Energy Use." Home Energy 17 (3), (May/June, 2000), pp. 32-36. They point out that each degree of difference between inside temperature and room temperature affects refrigerator consumption by 2.24%

billing data to arrive at a relationship between modeled UEC and actual billing data. The billing analysis approach may use the following data options:

- Use predicted unit energy consumption for all of the 2002 program population, along with information from the tracking data on primary versus secondary units.
- Use predicted unit energy consumption for a sample of 2003 participants along with information collected on changes affecting household consumption (an “informed” 2003 sample).

2) A degradation analysis will be conducted to determine the extent to which UEC increases over time, by comparing the DOE test results for refrigerator models when new (the label usage) with results found for old refrigerators of the same models. This analysis will be relatively inexpensive because the data are already available. No new data collection is required. Model matches will be done on previously metered sample model numbers to AHAM data to arrive at “as new” energy consumption values. These values will be then compared with metered results of old units in order to determine the degradation factor from DOE “as new” estimates. The degradation factor will also be compared to other studies on this issue².

3) Market Saturation of Recyclable Refrigerators

In the 2002 EM&V plans, we planned to analyze the market penetration of the recycling program as part of the energy efficiency-related gains achieved by the program by using the 2002 Residential Saturation Survey being conducted by California Energy Commission. Since this survey is facing delays and the data are not expected to be available until late 2003, this analysis will be taken up in the 2003 Study.

4) Follow-up to the 2002 Process Evaluation

The 2002 EM&V activities will provide feedback to the program implementers on elements of the recycling program that can be improved to enhance the program’s performance. In 2003, follow-up with the program managers, planners, and implementer will be conducted to implement recommendations from the 2002 EM&V process evaluations. This will include strategizing and implementing program delivery strategy for the Hard-to-Reach market.

Study Deliverables

The 2003 EM&V study is expected to produce a final report that adds some new and useful information to the body of studies on the energy savings achieved by refrigerator recycling programs. In addition, its follow-up process evaluation and market penetration analysis will provide clear information for policy and operational decisions to individual utilities, policy makers, the program implementer, and other stakeholders.

² R.G. Pratt and J.D. Miller. 1998. *The New York Power Authority's Energy Efficient Refrigerator Program for the New York City Housing Authority - 1997 Savings Evaluation*. PNNL-11990. Seattle, WA: Pacific Northwest National Laboratory. Table 2.1

NONRESIDENTIAL STANDARD PERFORMANCE CONTRACT PROGRAM 2003 EM&V PLAN

Sponsor: Southern California Edison

Introduction

In 1998, the CPUC broadened the nature and focus of energy efficiency programs in California. In particular, new programs supported by funding through a Public Goods Charge (PGC) were designed with market transformation, rather than energy savings, as the primary objective. The Nonresidential Standard Performance Contract (NSPC) program was a key element of the CPUC design for market transformation and the development of a self-sustaining industry of private energy efficiency services providers (EESPs), and the program design reflected those goals. The program was designed around the perceived strengths of the EESPs including using energy audits to identify energy savings opportunities; ability to finance installations; and measurement and verification expertise. The program design favored participation by EESPs, and customer-initiated projects were discouraged through restrictive rules (and prohibited altogether for smaller customers).

During the 2000–2001 California energy crisis, however, the focus of the program reverted to emphasizing the achievement of immediate energy savings. The NSPC program design was not radically changed to reflect the new CPUC policy goals, and the program design may not be optimal for the new focus on immediate energy savings.

This study will verify what energy savings were achieved. A process evaluation will review whether program in 2003 was run as planned and proposed to the CPUC. Third, the project will investigate how NSPC program rules and procedures contribute to the achievement of energy savings targets.

Study Objectives

The 2003 evaluation of the NSPC Program will have the following objectives:

- verify the reported energy savings results of the programs, including verification that equipment was installed as reported and a review of the energy savings estimates for a sample of projects and for the program as a whole;
- determine whether the PY2003 program was successfully implemented as designed, and whether program changes have had the desired effects on the operation of and participant satisfaction with the program;
- examine key features of the program for their impact on the program; and
- recommend any needed program modifications to program planners.

Study Description

To accomplish these objectives, the study shall include a verification study and a process evaluation.

1) Verification:

The NSPC program administrators already use third-parties to verify installation, so the verification portion of this project shall consist in reviewing and summarizing the program documentation for a representative sample of projects, and integrating the results across program administrators.

2) Process Evaluation:

The process evaluation will involve interviews with program managers, participating customers and EESPs, and non-participating customers and EESPs.

The process evaluation will help assess issues such as participating customers' satisfaction with the program administration and with standard performance contracting as a vehicle to encourage energy efficient equipment installation. For non-participant customers, the interviews will address customers' awareness, attitudes, and practices regarding performance contracting and other energy efficiency services. Comparisons to previous analyses shall be made to provide a trend analysis.

For participating EESPs, the focus would be on program changes in 2003 and whether the change was viewed as positive based on such things as the EESP's experiences with M&V requirements for projects in previous programs; any perceived differences in program design and administration among utilities and the value of consistency across the state; and whether participation in the NSPC program is affecting the EESP's business practices, marketing approach, and financial health. For non-participating EESPs, the focus would be on why they chose not to participate.

NSPC program manager interviews will investigate how the program is actually being administered, and determine, from the PMs' perspective, the effectiveness of program marketing strategies, and program implementation strategies, with a focus on the changes for PY2003.

3) Program Design Review.

Three features of the program will be examined. First, the **market demand** for the program will be investigated. Typically, the NSPC program is fully subscribed early in the program year. This raises the question of how much incentive funds should be available to pay for the available projects (assuming overall portfolio funding was not capped).

Related to this question is the comparison of program accomplishments over the last six years as compared with estimates of **market potential** for this kind of program and these kinds of measures.

Third, the Contractor shall conduct an analysis of the current **pricing**. Are the end-use prices optimal, or should there be more (or less) breakout by measure or measure type?

Study Deliverables

Based on the analyses of these various data collections, the 2003 NSPC EM&V study will produce a report that not only establishes energy impact achievements of the program but also provides clear information for policy and operational decisions to individual utilities, policy makers, the program implementers, and other stakeholders. The 2003 EM&V report will combine the program assessments of PY 2002 and 2003.

EXPRESS EFFICIENCY PROGRAM 2003 EM&V PLAN

Sponsor: Pacific Gas & Electric Company

Program Description/Introduction

The Express Efficiency Program is a Statewide Program that provides financial incentives to small and medium sized non residential customers for installing specific proven energy efficiency measures including lighting, heating, ventilation and air conditioning (HVAC), refrigeration, agriculture, gas, LED lighting technology and motor retrofit measures. The primary objective of the Express Efficiency program is to help small and medium businesses achieve long-term annual energy savings and demand reductions through energy efficient retrofits. The program is limited to small and medium customers with an emphasis on the hard-to-reach sector.

The 2003 evaluation will contrast participation rates with that of 2002 to analyze the restrictive impact of the aggregation rule on customer participation. This rule limited participation to customers with less than 500 kW per site in 2002. The rule was abrogated for 2003.

The 2003 evaluation will also analyze customer adoption of new program measures and their energy savings estimates.

Study Description

The statewide Express Efficiency evaluation study will continue established methods for evaluating program success and provide additional information regarding methods for effective energy savings. This evaluation study for 2003 will build on the evaluation results from PY2002 to include market penetration, customer behaviors and the impact and processes; e.g., aggregation rule, energy crisis and market penetration based on 2003 participation.

Study Objectives

The goals of the 2003 evaluation are to assess the program's ability to achieve energy savings, increase the participation of hard-to-reach businesses, assess the impact of state standards, Company and regulatory goals as well as discontinued technologies on program participation. The primary measurement of program success will be the verification of measure installations, and tabulation of the estimated energy and demand savings, including HTR. The evaluation will continue to address program delivery, program design, impact of studies performed in 2002, benchmarking, cost-effectiveness, and overall success in order to refine and optimize program delivery.

Evaluation Approach

The primary measurement of program success will be verification of measures installation and tabulation of the energy and demand savings for measures installed during the 2003 program. Estimates will be based on onsite verification of a selected sample of 2003 installations (across all utilities) to ensure that the rebated measures were installed correctly. An assessment of the verification process will be undertaken at the end of 2003 to ensure sampling validity. Actual savings claimed by the IOUs will be reviewed through an analysis that draws on the verification results and the in depth study of a sample of participants. The Study will focus on efforts during 2003 (program implementation) to track and assess impact of 2003 program improvements. The assessment will involve interviews with 2003 program staff, policymakers, vendors, etc., surveys and in-depth interviews of 2003 Express participants to ascertain the progress of the statewide integration and interim ongoing efforts for program. This M&E study will also reflect program and market changes that occurred during the program year, 2002.

Key Tasks

The study will include 1) analysis of 2003 program accomplishments, 2) review of energy and demand savings estimates, 3) comparisons between program changes in 2002 versus 2003 regarding a variety of effectiveness of program design, delivery and implementation, 4) an assessment of program targeting and customer satisfaction with special emphasis on statewide coordination and HTR outreach, 5) an analysis of incentive levels and options, and 6) sample on-site verifications of installed measures.

Deliverables

1) Research plan, 2) analyses, 3) draft report or reports, 4) final report or reports

Timeline: Start date 10/1/03; End date: 12/31/04.

STATEWIDE NONRESIDENTIAL RETROFIT ENERGY AUDITS PROGRAM EM&V STUDY 2003

Sponsor: Pacific Gas & Electric

Introduction

In 2004, the utilities' Evaluation, Measurement and Verification (EM&V) efforts for the statewide non-residential energy audits program will expand upon the efforts to evaluate the effectiveness of program implementation and to estimate energy savings for the 2003 program. We will use results and lessons learned in 2002 evaluations to inform study designs and work plans for 2003 efforts. We propose to evaluate new features in the 2003 non-residential audits program during implementation to better inform the program in terms of market response to program changes. The study descriptions below provide the focus and types of evaluations we expect to complete in support of 2004 program plans.

Program Description

In 2003 the Nonresidential Energy Audits Program will offer five distinct audit options to customers (telephone, mail-in, CD, web-based, and on-site). The program will basically have the same elements as in 2002. PG&E's PY2002 pilot audit call-back reminder will be continued.

From an evaluation perspective, we will examine customer satisfaction and preference by customer segment and audit type, and assess any difference from 2003. We will also examine the impact of the pilot audit call-back reminder in influencing customers to adopt EEMs recommendations over time. The results of this evaluation will be used to further enhance audit materials and their marketing efforts.

Audits are an information program that can move customers to take energy efficiency actions. However, it may take some time before customers take action. Given the waning impact of the energy crisis of 2000-2001, we want to continue to examine the ongoing impact audits have over time on customers' behaviors, attitudes and adoption of EEMs. Therefore, we propose to conduct surveys for both 2003 audit participants and past participants, to determine how and when audits result in customer adoption of energy efficiency, and better determine the frequency necessary for auditing customer facilities. We also propose to survey similar nonparticipating customers to contrast the adoption of energy efficiency between both groups. Identifying these actions and how customers tap into other energy efficiency programs allows for continuous enhancement of integration among programs.

Study Objectives

The 2004 EM&V Study for the Statewide Nonresidential Energy Audits Program will have the following objectives:

- Document energy efficiency actions taken by audit program participants over time, compared to actions taken by non-participants.
- Document participant satisfaction with the various audit options and marketing strategies.
- Assess current and pilot delivery vehicles and marketing mechanisms to ensure ongoing improvement of program delivery.
- Estimate energy and/or peak load savings accruing from participation in the audit program over time.

Study Description

To accomplish the aforementioned objectives, the Study will include:

1. Telephone surveys and/or interviews to collect data from a sample of participants and Program Managers. Data collected (complemented by Program implementation tracking data) should enable the assessment of: audits done by type and customer class (including HTR), percent of customers that respond to audit marketing efforts, reasons why customers participated or not, participant satisfaction, intended uses of knowledge gained, and process and marketing improvements.
2. A survey from a sample of participants to document energy efficiency actions (both with and without incentives) taken by participants and/or their employees as a result of the Program. This will be done for current and previous year audit participants, in view of anecdotal evidence that nonresidential customers typically take energy efficiency actions at least two to three years after initially being made aware of their options. We will also use this survey to assess the value of doing audit customer call-back reminders. We will also survey a sample of non-participants, to assess awareness, reasons for non-participation and their energy efficiency practices.

Estimates will be made of potential savings accruing from participation in the Program. We will use the results of the participant and non-participant surveys and deemed savings for measures from Express Efficiency as appropriate to quantify impacts for certain measures.

Study Deliverables:

The 2003 EM&V study will produce a report that describes the achievements of the 2003 program. This includes participation levels for various audit vehicles, a post-audit assessment of energy and peak power saving activities taken by participants in the 2003

program and in previous years, and an analysis comparing participant results with those taken by similar non-participants. The report will also provide process enhancement recommendations, and information for policy and operational decisions for future audit programs.

Timeline: Start date: 8/1/03; End date: 12/31/04.

BUILDING OPERATOR CERTIFICATION AND TRAINING PROGRAM 2003 EM&V PLAN

Sponsor: Pacific Gas & Electric

Introduction

In 2004, the utilities' Evaluation, Measurement and Verification (EM&V) efforts for the statewide non-residential Building Operator Certification and Training program will evaluate the effectiveness of program implementation for the 2003 program. The study descriptions below provide the focus and types of evaluations we expect to complete in support of future program plans.

Program Description:

Building operator certification and training programs educate operators of large and medium commercial buildings, including public buildings, on short-and long-term peak demand and energy savings strategies for their buildings. After participating in training activities, individual building operators are certified in efficient building operation. The Program is implemented in a uniform statewide fashion. Participants complete the course curriculum in approximately seven months. Participants who pass the course are certified. Building operators learn to get the most out of their systems by improving their analytical and practical skills on the job. The training includes equipment operations, the latest methods of building operation and maintenance and how to incorporate energy efficiency opportunities. The program remains mostly unchanged from PY2002, with minor modifications to training content.

From an evaluation perspective, we will examine customer satisfaction and assess any differences from 2002 program implemented in 2003.

Study Objectives

The 2003 EM&V Study for the Building Operators Certification and Training Program will have the following objectives:

- Examine participants satisfaction with program process and content of training
- Gather participant and non-participant recommendations for enhancements to Program process and content
- Understand how to better market program to non-participants
- Document all participant post-program energy efficiency adoption actions.

Study Description

The proposed Study will evaluate the Statewide 2003 Building Operator Certification and Training Program. The Study will provide a process evaluation and an assessment of

participants' self-reported energy efficiency actions taken as a result of the training. The evaluation approach will entail at least the following activities:

- A review of Program implementation tracking data to assess participant recommendations to process and content improvements.
- Telephone surveys that address participant satisfaction, participant and non-participant post-Program implementation actions and non-participant awareness, practices and reasons for not participating.

Study Deliverables

The 2003 EM&V study will produce a report that describes the achievements of the 2003 program. This includes participation levels, a post-participation assessment of energy and peak power saving activities taken by participants in the 2003 and previous year program, and an analysis comparing participant results with those taken by similar non-participants. The report will also provide process enhancement recommendations, and information for policy and operational decisions for future BOCT programs.

Timeline: Propose start date: 1/1/04 end date: 3/31/05

STATEWIDE NONRESIDENTIAL RETROFIT EMERGING TECHNOLOGIES PROGRAM 2003 EM&V PLAN

Project Sponsor: Southern California Edison Company

Introduction

The Statewide Emerging Technologies Program (ETP) is an information-only program that seeks to accelerate the introduction of energy efficient technologies, applications, and analytical tools that are not widely adopted in California. The program targets nonresidential customers (primarily) and is composed of two parts: 1) demonstration and information transfer, and 2) the Emerging Technologies Coordinating Council (ETCC).

The demonstration and information transfer portion of the program focuses on near-commercial and commercial energy efficient applications with low market penetration. The objective of the demonstration projects, which are conducted either at customer sites or in controlled environments, is to provide design, performance, and verification of novel energy efficient systems, helping to reduce the market barriers to their wider acceptance. The objective of the information transfer efforts, which are customized to targeted markets, is to disseminate project results and information about promoted technologies. A variety of means are used to disseminate results including: detailed project reports, design documentation, professional and industry forums, technical and non-technical publications, trade journals and shows, site visits and tours, internet web pages, workshops, seminars, conferences, and mainstream energy efficiency programs.

The ETCC is a statewide information exchange and coordination effort between Pacific Gas & Electric Company, San Diego Gas and Electric Company, Southern California Edison Company, Southern California Gas Company, and the California Energy Commission's Public Interest Research Program.

Given that some program activities such as showcases and disseminating information are carried out or have impacts that are realized over multiple years, the effective program period is longer than one year. Therefore, to adequately evaluate the extent to which program objectives have been achieved, the evaluation strategy must follow the same time frame as the effective program period. Given that 2002 was the first year the program was operated at the statewide level and many of the demonstration projects were in the earliest stages of development, it was not possible to measure baseline indicators of awareness amongst the target audience in the PY2002 evaluation. Instead, that evaluation focused on assessing the program dissemination and information transfer efforts of the program. Recommendations were provided to allow for mid-course corrections in 2003 that would improve the information dissemination efforts for the 2003 program. As a follow up to that study, the PY2003 evaluation study will evaluate the effectiveness of different information dissemination efforts that were employed as a result of the recommendations from the PY2002 evaluation and, where possible, conduct a limited number of in-depth interviews with current program participants to investigate the

progress of the projects, awareness of promoted technologies amongst the target audience, and assess satisfaction with and obtain feedback regarding the program process. Subsequent evaluations will be able to use these baseline indicators to evaluate market effects resulting from the program by measuring changes in awareness amongst the target audience that result from ETP activities and the adoption and use of promoted technologies. The study objectives listed below reflect this evaluation strategy.

Study Objectives

The objectives of the 2003 EM&V Study of the ETP are:

- Verify and document program accomplishments.
- Evaluate the effectiveness of program changes as a follow-up to the 2002 ETP process evaluation and update recommendations for improving program design.
- Measure baseline indicators of market effects resulting from ETP activities, where possible, as they relate to the impact of the program on the target audience, awareness of promoted technologies amongst the target audience, and assess customer satisfaction with the program process.

Study Description

The PY2003 ETP evaluation will entail the following activities:

1) Verification and Description of Program Accomplishments

Program data on the number of sponsored showcases, technology assessments, published articles, workshops, professional forums conducted, etc., will be collected and reviewed to verify and document 2003 program accomplishments. Information obtained from depth interviews with program staff and available data on the number of showcase attendees will provide supplemental information on program activities and accomplishments.

2) Follow-up Assessment of Program Changes

Interviews with program managers and an evaluation of dissemination efforts in 2003 will be conducted to evaluate the effectiveness of different outreach strategies used to reach certain target audiences relating to technologies promoted by the ETP. The findings also will be used to document any improvements gained from implementing recommendations made in the PY2002 ETP process evaluation.

3) Baseline Evaluation of ETP Market Effects

The general program theory is that ETP activities will cause an increase in awareness of promoted technologies amongst members of the target audience. Any changes over time in these indicators can be considered evidence of market effects to the extent that these changes can be directly associated with program activities. In the PY2003 evaluation, a limited number of in-depth interviews will be conducted with program participants to obtain baseline information about awareness and the adoption of promoted technologies amongst members of the target audience and also to obtain feedback regarding the

program process and ideas to improve the program. Future evaluations of the ET Program can then measure changes in these baseline indicators in an effort to document market effects resulting from the program and the continued use of targeted technologies by members of the target audience.

STATEWIDE NONRESIDENTIAL NEW CONSTRUCTION (NRNC) BUILDING EFFICIENCY ASSESSMENT (BEA) STUDY 2003 EM&V PLAN

Sponsor: Southern California Edison

Introduction

This study will build on the NRNC Building Efficiency Assessment (BEA) Studies from PY2000-2002 and will use a similar reporting format. The Statewide Nonresidential New Construction Building Efficiency Assessment (BEA) Study (MCPAT) is currently in its second round of data collection and reporting. The first round covered Savings By Design program activity from mid-1999 (program roll-out) to 2001. The current study covers program activity in 2002.

Savings By Design program tracking information is available from the IOU partners implementing the program. Additional information will be collected for a sample of program participants as well as comparable non-participants using on site surveys, and these data will be analyzed using DOE-2 simulations.

The non-residential new construction (NRNC) market is different from the retrofit market in that it produces buildings with integrated systems of measures. Retrofits are primarily one-for-one replacements of existing systems or components. While we can track the installation rates of individual measures in new construction, the true target is whole building efficiency. New building energy efficiency is the product of complex design practices, and of the interactions of multiple measures. This makes for interesting challenges in assessing and evaluating changes to the NRNC market. Consequently, the study needs to calculate savings by the end-use of systems improvements, as well as by whole building integrated design. The information developed should help assess the success of NRNC program designs and implementation activities.

Study Objectives

This on-going study quantifies the whole-building and end-use energy savings and efficiencies of both participant and non-participant buildings.

The approach to developing these data has been used for evaluating statewide commercial new construction since 1999 and the results can be referenced back to previous data to develop on-going trends. The results provide timely feedback to program managers and policymakers and should facilitate incremental improvements to program process and operations. The results will also identify changes in design practices as a result of program operation. This project tracks program participant attitudes and responses to the program, including information on program design, the application process, the design assistance services provided by the programs, the timing of program events relative to project events, etc.

Study Description

The study approach will be consistent with the BEA 2000-2002 approach, with modifications made as necessary to further investigate results and trends. Specifically, the study will include the following steps:

- Conduct in-depth decision-maker interviews to assess program acceptance, and participant attitudes towards energy efficiency and to solicit feedback on program design.
- Conduct detailed on-site surveys and build DOE-2 models of each building in the sample.
- Calculate energy savings by end use and for whole buildings, as the difference between as-built and baseline energy efficiencies.
- Develop quantifiable information on the changes in building efficiency attributable to the Savings By Design program influences. Information about the new Title 24 requirements should also be developed for a similar population of non-participating buildings.
- Track specific building and equipment characteristics (e.g. types of glazing, types of lamps, ballasts and light fixtures, HVAC system types, etc.).
- Investigate trends in energy savings, characteristics and/or decision-maker attitudes.

This project will address the participant population for the Savings By Design program, as well as a comparable population of non-participating buildings. Program tracking system data will enable selection of the participant sample, while Dodge data will allow selection of comparable non-participant buildings.

On-site surveys of a sample of buildings, both participants and non-participants are conducted and DOE-2 models are built based on the surveys. Energy savings are calculated by end-use and for whole buildings. Quantifiable information is developed on the changes in building efficiency attributable to the SBD program influences. Specific building and equipment characteristics (e.g., types of glazing, types of lamps, ballasts and light fixtures, HVAC system types) are tracked

Specific tasks include:

1. Select a representative sample of Savings By Design program participants, stratified by building type, energy savings, size and utility service territory.
2. Select a sample of non-participant buildings.
3. Conduct on-site surveys of sampled buildings, using established data collection protocols for consistency with previous studies.
4. Prepare database of building characteristics, using established data format for consistency with previous studies.

5. Develop as-built DOE-2 models of each building. Develop parametric run variations to determine efficiency of buildings compared to Title 24 baseline on an end-use measure basis.
6. Prepare database of run results.
7. Develop summary graphs, tables and report of on-site data and DOE-2 analysis.
8. Prepare final reports, solicit reviewer comments.
9. Present findings to NRNC program managers and stakeholders.

Study Deliverables

The 2003 BEA Study will produce gross and net program impacts. The net-to-gross analysis will attempt to estimate the portion of the savings that can be directly credited to the program. The results of the gross and net analysis will be discussed in an interim report. At a minimum, the report will describe the analysis methodologies and summarize the results. An annual report will be prepared that combines the various interim reports and other intermediate deliverables required in the Study, incorporating reviewers' comments on the earlier reports, and rewriting as necessary to provide continuity and final conclusions. For continuity, the final report will have the same structure as the PY2000-2002 reports.

The on-site surveys collect detailed building operation and equipment characteristics used to develop DOE-2 models to estimate energy and demand use and savings. The on-site survey data is entered into the existing BEA building characteristic Access database. The on-site survey data will be used to develop "as-built" DOE-2 simulation models. The results of the DOE-2 simulations will be extracted from the output reports and compiled in the existing BEA Access database. This database will be published on the CALMAC web site as a resource to program planners and other researchers.

STATEWIDE NONRESIDENTIAL NEW CONSTRUCTION (NRNC) MARKET CHARACTERIZATION AND PROGRAM ACTIVITY TRACKING (MCPAT) STUDY 2003 EM&V PLAN

Sponsor: Southern California Edison

Introduction

The Statewide Nonresidential New Construction Market Characterization and Program Activity Tracking Study (MCPAT) is currently in its second round of data collection and reporting. The first round covered nonresidential new construction market activity in 2000 and 2001. The current study covers activity in 2002. Tracking the changing characteristics of the NRNC market over time provides information for refining program design and for assessing program accomplishments.

This on-going project provides bi-annual reports of statewide NRNC market and program activity Savings By Design program tracking information is available from the IOU partners implementing the program. Program and market characteristics, by building type, will be reported at the utility level, the county level and the statewide level. This data will be tracked on an on-going basis, and developed into standardized reports to allow for assessment of the NRNC market over time.

The success of the study is important because evaluation of energy efficiency initiatives requires knowledge of baseline market conditions, and changes relative to that specific baseline over time. The value of this activity will increase over time as time-series data accumulates.

Study Objectives

The MCPAT study will continue to provide information for the following two areas:

NRNC market characteristics: construction value and volume, types of buildings, design team characteristics, etc. This information is needed so that NRNC market activities can adapt and prioritize their efforts to meet the needs of the different segments. Data will be collected describing the construction value and volume of the NRNC market, types of buildings, sizes of buildings, types of owners, and design team characteristics. The characteristics of the NRNC market including the actions and changes that occur over time will be tracked.

NRNC Savings By Design (SBD) program activity tracking and penetration in the NRNC market. Data collected will include the number of program participants, type of participants, number of projects signed up for the program, type and size of projects, type of measures installed, and geographic locations. This information is drawn from each of the Partner utilities' internal tracking systems. Similar to the activities conducted in PY2000-2002, the data will be integrated to support statewide and cross-utility analyses.

Study Description

Continued and consistent tracking of market characteristics and program activity is important for analyzing program penetration and identifying long and short term trends in the NRNC market.

The study approach will be consistent with the MCPAT 2000-2002 approach. Specifically,

- Dodge Reports on current and pending non-residential new construction projects, and permit data assembled from city and county building departments by the Construction Industry Research Board will serve as primary resources for conducting the quarterly NRNC market characterization.
- The Partner utilities' Savings by Design tracking systems will be obtained, and the data will be consolidated into a statewide SBD database. The SBD statewide database and will constitute the basis for the SBD Program Tracking and Penetration Analysis.

Using the SBD program activity data and the NRNC market characterization data, semi-annual SBD Program Tracking and Penetration Analysis Reports are prepared. The reports will categorize and analyze the SBD program activity according to number of participants in the program, number of projects signed up for the program, type and size of projects, and energy savings. The reports will analyze the relative penetration of the SBD program activities in the different NRNC market segments and service territories. The reports will also document trends over time, as the Program extends its activity in the NRNC market. Program penetration will be calculated as the fraction of total NRNC projects that participated in the SBD program.

Specific tasks include:

1. Obtain updates to the Dodge database of new construction
2. Obtain updates on statewide building permit data
3. Obtain updates to the SBD program tracking database(s)
4. Analyze and summarize data
5. Prepare standardized reports
6. Summarize the findings of market changes and trends observed
7. Prepare final reports, solicit reviewer comments
8. Present findings to NRNC program managers and stakeholders

Data Collection Sampling Design

The data collection design for this study consists of collecting new construction information for the overall market and Savings By Design program activity data. For NRNC market activity, data are collected to describe construction value and volume of

the NRNC market, types of buildings, size of buildings, and design team characteristics. For consistency with previous studies, the following F.W. Dodge data sources will be used:

- F.W. Dodge's *Market Analyzer* service records and reports the number of new projects, dollar value, square footage, and project type by specific counties or by Metropolitan Statistical Areas.
- F.W. Dodge's *Market Players* service provides specific project details and contact information, including owner, design team, builder, and contractor.

These Dodge Reports provide detailed project information on construction projects started within a given time period. Once obtained, the F.W. Dodge database updates will be available as a source of information regarding the NRNC market for other NRNC studies beside MCPAT.

To supplement the F.W. Dodge Reports, Construction Industry Research Board (CIRB) data will also be obtained. The CIRB obtains building permit data from the state's more than 515 city and county building departments in California. The CIRB will supply monthly data by county and building type, describing permit value. While these data are not by far as complete as the F.W. Dodge Reports, they will provide a framework for the volume of permits that are filed in California each quarter.

Data Collection Procedure

For program activity tracking, data collected will include the number of participants in the program, type of participants, number of projects signed up, type and size of projects, and energy savings. These data will be drawn from each of the Partner utility's internal tracking system, which will be combined into a common statewide database.

The task begins with a data request to each Partner utility. Once data from all of the SBD tracking systems have been received, the contents of each database will be compared and assessed for data consistency and completeness.

Data Collection and Consolidation

Once the F.W. Dodge and CIRB data are assembled, they will be cleaned following the used in PY2000-2002 studies for consistency. Projects from the F.W. Dodge database will be mapped to each utility's service territory using the zip code-to-utility mapping obtained from the CEC, and revised in PY2001.

The internal SBD databases from the utilities will be examined for consistency and completeness and will be consolidated into one statewide database. The database structure will allow reporting on SBD activities statewide, as well as for each utility territory separately, in standardized semi-annual reports.

Data Analysis

The cleaned data will be summarized in standardized reports. These reports will cover actions and changes that occur in the NRNC market over time. At a minimum, the reports will describe the construction value and volume of the NRNC market statewide

and for each utility territory, types of buildings, size of buildings, and design team characteristics in a format consistent with the reports produced in PY2000-2002.

The data will be analyzed as follows:

- To assess the comprehensiveness of the F.W. Dodge database, the overall number of permits issued by utility territory obtained from CIRB, will be compared with the number of permits recorded by the F.W. Dodge Database.
- The F. W. Dodge data will then be used to report recorded permits, project location (county), building type, project type (new vs. remodel/renovation), project value, and project size (square feet). Information regarding the firms providing architectural, engineering, and contracting services (number, names and addresses, service provided) will also be reported by number of permits, project value, and project type (new vs. remodel/renovation).

Using the NRNC market data and the program summary data, reports of program market activities and penetration will be developed. The reports will categorize and analyze the SBD program activity according to number of participants in the program, type of participants, number of projects signed up for the program, type and size of projects, and energy savings. The reports will also document trends over time. The reports will analyze the relative penetration of the SBD program activities in the different NRNC market segments and service territories. Program penetration will be calculated as the fraction of total NRNC projects that participated in the SBD program.

Final Report

An annual report will be prepared that combines the various intermediate deliverables required in the Study, incorporating reviewers' comments on the earlier reports, and rewriting as necessary to provide continuity and final conclusions. For continuity, the annual report will have the same structure as the PY2000-2002 reports.

Study Deliverables

The 2003 MCPAT Study will produce several semi-annual reports that summarize market activities and program penetration within the state of California. This information is useful for assessing program accomplishments and for refining program design.

The reports will provide characteristics of the NRNC market, including:

- construction value and volume,
- types of buildings, and
- types of construction (new construction or renovation)

The information will be reported by county and IOU, in addition to statewide.

The reports will provide SBD program activity including:

- number of projects,
- square footage, and
- estimated savings of the projects approved for incentives

Program activity is summarized by building type and by program approach for each of the IOUs as well as statewide. Program activity is also described in terms of program penetration into the new construction market, at both the IOU and statewide level.

TECHNICAL SUPPORT FOR THE 2003 STATEWIDE NONRESIDENTIAL NEW CONSTRUCTION PROGRAM AREA 2003 EM&V PLAN

Proposal Sponsor: Southern California Edison Company

Introduction

As part of its NRNC MA&E Program Area duties, Southern California Edison (SCE) will be requiring a consultant to provide technical expertise for the management of nonresidential new construction (NRNC) MA&E studies. This work includes RFP development, proposal review, and review of contractor work and deliverables, as well as planning and participation in the statewide NRNC program and MA&E activities. It is necessary for the thoughtful and responsible administration of the MA&E activity.

Study Objectives

The objective of this effort includes RFP development, proposal review, work statement development and coordination with other statewide area managers through participation in MAESTRO. The projects that will be developed and managed under this contract will be coordinated with other projects and studies being conducted in other MA&E program areas. The objective of this contract is to obtain technical expertise and project management support to enhance the NRNC MA&E program area. When necessary and prudent, the contractor will be used to analyze NRNC program and market related data.

Study Description

1) Coordinate, Revise and Implement NRNC Program Area Plans for 2003

Develop RFP's for projects outlined in the PY2003 plans. As part of the statewide MA&E program area plans, specific projects need to be described and implemented. Other contractors will perform most of the projects, however, the consultant selected under this contract will supervise and coordinate with the other project contractors and work with SCE to issue Requests For Proposals (RFP's).

2) Project Implementation & Management

Supervise contractors' work and provide guidance to contractor on project deliverables. Participate in regular project meetings, including kick-off meeting, and conference calls. Provide monthly updates of project deliverables, timelines, and data collection and analysis activities.

The project management task includes initiating all project work via kick-off meetings and contractor training, reviewing contractors' activities and providing on-going guidance to field and analysis staff. Monthly updates will be provided that indicate project status for all activities, including data collection, data analysis, and reporting.

3) Participate in MA&E Meetings

Represent SCE on Nonresidential New Construction matters at the MA&E Program Area Managers (MAESTRO) meetings. The purpose of the meeting participation is to provide statewide coordination of programs and to identify opportunities for time and cost savings and sharing of data. MAESTRO was established to ensure continued communication and coordination among the area managers. The NRNC MA&E work will be developed and managed in coordination with other MAESTRO members.

4) Program Area Coordination with Other Area Managers

Coordinate specific project objectives, tasks and timelines with the other MA&E program area managers. Contractor will participate as a Project Advisor in other MA&E studies. Coordination includes participation as a project advisor for other MA&E studies at the request of other MA&E managers. Contractor will spend enough time reviewing the other MA&E activities to understand their objectives, tasks and timeline. This activity will often include participation in conference calls and meetings.

5) Summarize Savings By Design Program Cost-Effectiveness

Summarize the program filings from the Savings By Design Program (SBD), along with other market data from other NRNC to give a statewide overview of the program cost effectiveness and economics. The research will summarize dollars spent for incentives, design assistance, and program administration; associated energy savings and demand reductions, staffing levels, numbers of projects, market penetration, etc. It will analyze program results and make recommendations for improving cost effectiveness.

Specific tasks for this element include:

1. Collect program earnings filings and associated workpapers for each of the utilities involved in administering Savings By Design, for the past four years.
2. Extract and summarize data on program activity, incentives paid, design assistance, program administration and other costs.
3. Compile and summarize data on program participation, savings and demand reduction, and market penetration.
4. Prepare discussion of trends observed and other findings.
5. Prepare final reports, and present findings to NRNC program managers and stakeholders

The Consultant will be asked to include ownership and disclaimer language in all reports. The Project Manager will provide the language to be used, as directed by the CPUC, before the Final Report is to be issued. Ownership of the Final Reports will be vested in the CPUC.

2003 CALIFORNIA ENERGY STAR® NEW HOMES PROGRAM 2003 EM&V PLAN

Sponsor: Pacific Gas & Electric

Introduction

In 2004, the utilities' Evaluation, Measurement and Verification (EM&V) efforts for the statewide California Energy Star New Homes Program will expand upon the 2003 EM&V effort to evaluate the effectiveness of program implementation and to estimate energy savings for the 2003 program. This Study will use results and lessons learned in 2003 evaluations to inform study designs and work plans for 2004. This Study also will evaluate the PY 2003 program refinements. These refinements include changes in rebate levels and increased design and inspection assistance to multi-family builders.

The study descriptions below provide the focus and types of evaluations we expect to complete in support of an ongoing assessment of program plans.

Program Description

The California Energy Star New Homes Program is designed to encourage single family and multi-family (including rental apartments, condominiums and town homes) builders to construct units that reduce energy usage through a combination of financial incentives, design assistance and education. Due to the long-term nature of new construction, these incentives will be available to participants that meet the Programs' requirements and can be verified by December 2005. The Programs are performance based and no specific measures or equipment are required for participation or qualification.

The PY 2003 Program has the same basic program requirement and builder incentives to encourage builders to exceed the new construction energy efficiency codes by 15% as the PY 2002 Program. However, the PY 2003 program has either eliminated or reduced incentives to encourage builders to exceed Title 24 by 20%. To encourage increased participation by multi-family builders, the PY 2003 program offers a design assistance incentive and help with inspections.

Study Objectives:

The study has the following objectives:

- Document energy savings and compare energy savings estimates for the PY 2003 program with the energy savings estimates from the PY 2002 program.
- Determine if there have been any changes in the building characteristics of program participants between the PY 2002 and PY 2003 programs.
- Investigate builders' perceptions of the California Energy Star New Homes Program.
- Evaluate the effectiveness of program modifications made in PY 2003.
- Recommend additional program modifications if warranted.

Study Tasks Description:

1. Determine the ex post energy savings by reviewing the workpapers for each IOU for both the single-family and multi-family program components. The ex post energy savings determination will focus on homes fully constructed and inspected by March 31, 2005. A comparison shall be made of the energy savings estimates between the PY 2002 and PY 2003 programs.
2. Use information in the CHEERS registry and program tracking databases to determine the building characteristics of participants. Building characteristics for both single-family and multi-family dwelling units would include: dwelling unit size, number of floors, appliance type and efficiency levels, insulation levels, window characteristics, duct characteristics, etc. for a statistically valid sample of program participants. This information will be used to determine if there have been any changes in the measures most likely to be installed by builders between the PY 2002 and PY 2003 program. This measure comparison will also be used to help explain differences in savings estimates between the PY 2002 and PY 2003 programs.
3. Conduct interviews with program managers to determine from their perspective the effectiveness of PY 2003 program modifications. These modifications include eliminating or reducing the rebate to achieve 20% savings from the codes and additional assistance to multi-family builders.
4. Conduct interviews to collect data from participating single-family and multi-family builders regarding builder perceptions of the program modifications. The results from these interviews will be used to determine if any program modifications are warranted and will help confirm program impacts.
5. Conduct interviews to collect data from non-participating builders regarding builders' awareness of the program and builder perceptions of the program. The results from these interviews will also be used to determine if any program modifications including changes in program promotion activities are warranted.
6. Develop program recommendations by synthesizing, analyzing and comparing the results of the following: energy savings estimates, building characteristics analysis, interviews with program managers, participating builders and non-participating builders.

Deliverables

1) Data Collection Instruments, 2) Draft Reports, 3) Final Reports

Timeline: Start date: 3/1/04; end date: 6/30/05.

CROSSCUTTING UPSTREAM RESIDENTIAL LIGHTING PROGRAM 2003 EM&V Plan

Sponsor: San Diego Gas & Electric

Introduction

The statewide Crosscutting Upstream Residential Lighting Program will continue to be offered in PY2003. The evaluation will therefore be able to build upon the evaluation of the PY2002 program. In addition, the study will benefit from the 4 Phase Study on the Statewide Residential Lighting and Appliance Program. Phase 1 Baseline Assessment was completed in 1999. Phase 2 Documentation and Rationale for program changes was completed in 2000. Phase 3 & 4 Market Effects Studies were completed in 2001 and 2002, respectively.

Study Objectives

The 2003 EM&V Study for the Upstream Residential Lighting Program will have the following objectives:

- Evaluate Program Effectiveness, Marketing and Outreach Activities
- Verify savings claims/measure installations in program year 2003
- Verify the achievements in the Hard-to-Reach markets
- Measure energy savings and demand reductions through augmentation of the 2002 Study

Study Description

To meet the objectives listed above and to build upon the 2002 evaluation, measurement and verification work for this program, this study will be comprised of the following aspects.

1) Program Performance Improvement Follow-ups:

Customer surveys, decision-maker interviews, and advertising awareness for both the HTR and non-HTR markets will be undertaken for the PY2002 evaluation. The research questions to answer include: Is the message being heard and understood? What percentage of eligible customers are participating in the program? What are the reasons customers choose to participate or not to participate? The 2002 EM&V activities will provide feedback to the program implementers on elements of the program that can be improved to enhance the program's performance. In 2003, follow-up interviews will be conducted with program implementers to assess the resulting changes and their impact on program operation.

2) Verify savings claims/measure installations in program year 2003:

The program design presents challenges for verification of measure installation. The program provides instant rebates at the time of purchase and buy downs at the manufacturer level (with safeguards to prevent double dipping). Therefore, the end user cannot be found in a tracking database. The study will use zip code-to-phone pre-fix mapping to identify areas near the retail establishments participating in the program. A series of questions will be developed to identify those customers who bought and installed measures offered through the program.

3) Verification of the Hard-to-Reach Achievements:

The Upstream Residential Lighting Program has 2 distinct HTR goals: 1) 15% of the rebate budget is reserved for customers in the HTR residential sector and 2) 10% of the rebate funds are reserved for redemption through grocery and drug stores. The study will validate the IOU claims in this area through a verification of where the rebate funds were distributed.

4) Measure Energy Savings and Demand Reductions through Augmentation of the 2002 Study

This study will augment the current 2002 plan to collect data on lighting usage patterns for the purpose of measuring savings and install lighting loggers at a sample of 100 homes with at least one CFL installed. The 2003 MA&E study will increase the sample size by 300 homes. The 400 sites will be clustered within 4 regions throughout the state: (1) SF Bay Area, (2) Central Valley, (3) Los Angeles County (excluding LADWP), and (4) San Diego. These clusters represent the major rural/urban and geographic distinctions within the IOU service territories.

The goal is to install meters on all fixtures that contain CFLs. On average each home will have approximately 3 fixtures containing CFLs, for a total of approximately 1200 loggers on 400 homes. This diversity will hopefully allow for reporting significant differences by utility, wattage, fixture type, and room type categories. In addition, this expanded effort will account for differences in usage patterns over a longer period of time. Current plan for 2002 will collect usage data from July – December 2003. The augmented plan would allow for staggered data collection over 12 months – e.g., 133 July – December 2003, 133 September 2003 – February 2004, 133 January – June 2004.

Study Deliverables

The 2003 EM&V study is expected to produce a final report that establishes the most reliable available estimates of gross and net energy savings achieved by the PY2003 Upstream Residential Lighting Program. In addition, the process evaluation and Hard-to-Reach markets analysis sections will provide clear information for policy and operational decisions to individual utilities, policy makers, the program implementers, and other stakeholders.

STATEWIDE EDUCATION AND, TRAINING AND SERVICES PROGRAM 2003 EM&V PLAN

Project Sponsor: Southern California Edison

Introduction

The Statewide Education, Training, and Services Program is offered in the service territories of Pacific Gas & Electric Company (PG&E), San Diego Gas and Electric Company (SDG&E), Southern California Edison Company (SCE), and Southern California Gas Company (SCG). Three of the four utilities, PG&E, SCE, and SCG, have physical energy centers, while SDG&E offers energy efficiency classes to customers using other facilities and non-utility sites. The term “energy center”, as used here, is inclusive of SDG&E in any discussion of seminars or classes.

The educational and informational efforts of the energy centers (physical and virtual) promote energy efficiency to a broad spectrum of market actors including consumers, midstream actors such as design, engineering, and contract communities, and upstream market actors. The centers also support other Public Goods Charge programs by distributing incentive and financing program promotional materials, and providing field support, seminars, displays, equipment demonstrations, and face-to-face contact with customers in a variety of venues, which include trade-shows and community meetings. The centers collect, transfer, research, evaluate, demonstrate, and showcase energy efficiency concepts, technologies, and products for manufacturers, businesses, researchers, educational institutions, and the general public. The centers are a physical “one-stop-shop” or single-source contact for the customer and other market actors, who thereby gain access to an abundance of energy efficiency resources.

This evaluation study entails a needs assessment to determine how best the energy centers can improve current services and expand their reach to serve a larger market. Specifically, the study will complete a customer segmentation analysis of each energy center’s primary target population(s) (e.g., commercial and industrial customers, residential customers, or midstream/upstream market actors), explore barriers to participation in energy center activities (such as distance and time), and develop recommendations for improving the promotion and targeting of existing services as well as new programs and services that focus on the needs and barriers not currently or effectively addressed by the energy centers.

An assessment of customer (market actor) needs and participation and of barriers to participation in energy center activities will enable program managers and planners to improve program course offerings and services. To the extent that the results of this assessment impact the program’s ability to overcome barriers to the adoption and implementation of energy efficient technologies and practices, the evaluation will, ultimately, lead to greater achievement of program objectives and an improvement in future program performance.

Study Objectives

The objectives of the 2003 EM&V Study of the Education, Training, and Services Program are:

- Verify and document program accomplishments.
- Complete a customer segmentation analysis of each center's primary target population.
- Explore the barriers to participation in energy center activities and develop recommendations for improving the promotion and targeting of existing services as well as new programs and services.

Study Description

The PY2003 Education, Training, and Services Program evaluation entails the following activities:

1) Documentation of Program Accomplishments

Program data on the number of program activities completed such as seminars, workshops, tours, etc., will be collected and reviewed to verify and document 2003 program accomplishments including the achievement of hard-to-reach goals.

2) Needs Assessment on Expanding Energy Center Reach

The key elements of this aspect of the evaluation entail: a) characterizing target segments for the energy centers based on SIC code; b) merging market characterization data with energy consumption and demand data; c) mapping customers within the target segments according to their geographic location (and proximity to the respective Centers) by business type and energy use classifications. This profile will characterize the types of customers and market actors served and their proximate location to the energy centers and can be used to identify the specific energy-related needs of potential participants. The segmentation analysis will also distinguish the characteristics of customers and market actors who typically participate in center activities as compared to those who do not participate and enable program managers to redirect efforts where necessary to better meet the needs of the target audience.

3) Recommendations for New and Improved Course/Service Offerings

Another key element of the study entails merging the findings from this needs assessment and segmentation analysis with the market effects findings from the PY2002 Education, Training, and Services evaluation to orient needs and market barriers according to geographic location and business type classifications. This information will be used to develop recommendations for new and/or improved course offerings that are tailored according to the needs identified in this and previous evaluation studies.

STATEWIDE NONRESIDENTIAL NEW CONSTRUCTION (NRNC) CODES AND STANDARDS ADVOCACY STUDY 2003 EM&V PLAN

Sponsor: Southern California Edison

Introduction

The statewide Codes and Standards Advocacy program (Codes and Standards) supports upgrades and enhancements in energy efficiency standards and codes. Codes and Standards Enhancement (CASE) studies for energy efficiency improvements are performed for promising design practices and technologies and are presented to standards and code-setting bodies. Pacific Gas & Electric Company (PG&E), Southern California Edison Company (SCE), San Diego Gas & Electric Company (SDG&E), and Southern California Gas Company (SoCalGas) have developed CASE initiatives on various cost effective building and appliance energy efficiency measures. A summary report will be completed for each CASE study active during 2003. The utility program goals are for the utilities, collectively, to report on no fewer than 23 CASE studies (new and existing) in 2003.

The current Codes and Standards (C&S) program evaluation is determining the energy and demand impacts of the utilities' statewide codes and standards efforts on the 2005 Title 24 changes. The major technical effort for selecting the code changes took place in 2002 and the first half of 2003. The next phase of the code adoption process is to refine the language and develop supporting documents (manual, compliance forms, etc.). The Energy Commission and their contractors primarily do this work, with less involvement by the utilities. The utilities' efforts should increase in 2004 with training and other educational efforts geared toward implementation of the code changes. Therefore, we suggest that a significant C&S evaluation be deferred to 2004.

Due to budget limitations, we propose instead to extend the 2002 EM&V codes and standards study to include early 2004 verification of whether the 2003 program goals are met.

Study Objectives

The current study summarizes the efforts at improving energy code enforcement and development at both the state and the local level. The study draws on the utilities' individual program reporting on CASE initiatives and develops a consolidated view of the codes and standards efforts statewide.

The 2003 add-on study objectives are to:

1. Verify that the CASE initiatives were completed and delivered into the Title 24 revision process.
2. Document the CASE initiative process for future evaluation efforts.
3. Recommend benchmarking procedures for future CASE initiative evaluations.

Study Description

The study approach will be consistent with the 2002 C&S study approach. The contractor will work with staff and contractors of the codes and standards programs at each utility to collect CASE reports.

The C&S program entails a great deal of interaction and cooperative effort between the program's staff and contractors, and the regulatory staff and other stakeholders involved in developing and implementing codes and standards. The contractor will also talk with staff and stakeholders of the California Energy Commission who are involved with building and appliance standards to assess the effectiveness of the CASE initiatives.

The study report will include the following elements:

10. Identify whether the program goals were met.
11. Summarize all the CASE initiatives.
12. Summarize where each CASE initiative is in the code adoption process.
13. Provide assessment of the likelihood that the CASE initiative will be adopted into code.

Study Deliverables

A draft report will be prepared that includes the elements mentioned above. The draft report will be circulated to all stakeholders. A final report will be prepared that incorporates reviewers' comments.