

**BEFORE THE PUBLIC UTILITIES COMMISSION  
OF THE STATE OF CALIFORNIA**

Order Instituting Rulemaking to Examine the  
Commission's Future Energy Efficiency  
Policies, Administration and Programs.

Rulemaking 01-08-028  
(Filed August 23, 2001)

**JOINT FILING OF SAN DIEGO GAS & ELECTRIC COMPANY  
(U 902 M), SOUTHERN CALIFORNIA GAS COMPANY (U 904 G), PACIFIC  
GAS AND ELECTRIC COMPANY (U 39 E), AND SOUTHERN CALIFORNIA  
EDISON COMPANY (U 338 E) ADDRESSING EVALUATION, MEASUREMENT  
AND VERIFICATION STUDIES OF PROGRAM YEAR 2003 ENERGY  
EFFICIENCY STATEWIDE PROGRAMS**

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June 16, 2003

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In accordance with Ordering Paragraph 11 of California Public Utilities  
Commission Decision (D.) 03-04-055, San Diego Gas & Electric Company (SDG&E),  
Southern California Gas Company (SoCalGas), Pacific Gas and Electric Company  
(PG&E) and Southern California Edison Company (SCE) jointly submit the attached  
evaluation, measurement and verification (EM&V) study plans in connection with  
Program Year (PY) 2003 energy efficiency statewide programs.

**Respectfully Submitted,**

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June 16, 2003

**CALIFORNIA MEASUREMENT ADVISORY  
COUNCIL (CALMAC)**

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

June 16, 2003

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## 2003 MA&E STATEWIDE STUDY COST ESTIMATES

(IN \$000)

<b>Overarching Studies</b>	<b>Proposed Budgets</b>	
CALMAC Website Maintenance & Workshops	\$	50
Master Contract for Coordination	\$	80
Summary Study (aggregation of all EE programs)		
DEER (incremental funding)	\$	35
HTR Update	\$	30
Energy Saving Potential	\$	400
Industrial & Emerging technologies		
New Con Potential		
Data Integration		
Res.market share tracking		
Best Practices Database	\$	100
<b>Overarching Studies Subtotal</b>	<b>\$</b>	<b>695</b>
<b>UTILITY STATEWIDE STUDIES</b>		
<b>Residential-SW</b>		
Retrofit Programs (existing buildings)		
Single Family Rebates	\$	250
Multifamily	\$	225
Mail-in/On-line Audits	\$	110
Ref Recycling	\$	300
<b>Nonresidential-SW</b>		
Retrofit Programs (existing buildings)		
SPC (large & small)	\$	200
Express Efficiency	\$	250
Audits (on-site)	\$	200
Bldg Operator	\$	40
Emerging Tech Demo	\$	40
<b>New Construction</b>		
NRNC -BEA	\$	350
NRNC -MCPAT	\$	100
NRNC- Tech Support	\$	60
RNC	\$	200
<b>Cross-Cutting-SW</b>		
Res/Nonres Retrofit/New Construction		
Res Lighting	\$	275
Education & Training Svcs.	\$	115
Codes & Standards	\$	90
<b>Utility Statewide Subtotal</b>	<b>\$</b>	<b>2,805</b>
<b>STATEWIDE MA&amp;E TOTAL</b>	<b>\$</b>	<b>3,500</b>
<b>STATEWIDE MA&amp;E UTILITY BUDGET</b>	<b>\$</b>	<b>2,500</b>
<b>TOTAL 2003 MA&amp;E BUDGET</b>	<b>\$</b>	<b>6,000</b>

## **OVER-ARCHING STUDIES**

# CALMAC WEBSITE MAINTENANCE AND WORKSHOPS 2003 EM&V PLAN

Sponsor: Pacific Gas & Electric

## **Project Description**

The proposed project will maintain the current CALMAC Web site 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 Web site Committee to continually assess the Web site for issues and/or enhancements that would increase the value of the site for its users. Such enhancements potentially include:

- Incorporate program type as a search field in the searchable database;
- Develop and submit for approval protocols for acceptance and upload of reports from the various third parties that should be submitting reports for the 2003 evaluations. Search 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 percent of reports that do not currently have them so that all reports in the searchable database are available electronically; and
- 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 4: Maintain and enhance the CALMAC listserv as needed to support CALMAC and MAESTRO intra group communication and CALMAC announcement capability.

Step 5: Work with the Web site Committee, the Web site host, and the CEC librarian to maintain the report upload system for new reports, making sure the database information is correct.

Step 6: Act as a conduit between CALMAC and the Web site host to maintain the database, Web site, and listserv.

## **Project Strategy**

Maintain site information currency and enhance site usefulness.

## **Key Tasks**

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

**Project Deliverables**

(1) A current and operable CALMAC Web site at all times and (2) timely turnaround on enhancements as they are identified and agreed by the website committee.

**Timeline**

Start date: January 1, 2004

End date: June 30, 2005



# **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. .

# STATEWIDE ENERGY SAVINGS SUMMARY

## 2003 EM&V Plan

Sponsor: Southern California Edison

### Introduction

Each year, California electric ratepayers provide roughly a quarter of a billion dollars in public goods charge ((PGC) funding to support energy efficiency programs. Significant amounts of money and effort are spent to assess the effectiveness of individual programs and the markets these programs are seeking to influence. Numerous evaluation reports and quarterly filings are prepared and submitted to the California Public Utilities Commission (CPUC) and others. However, there is no systematic process to aggregate these data to report annual energy savings and actual program expenditures. The study described below would collect the relevant data and provide these much-needed annual totals for the 2002 and 2003 program years. This summary information is essential to show what California received for its expenditures on energy efficiency.

In 2002, CALMAC commissioned a study to summarize the collective impact of energy efficiency programs in California in 2001 (“2001 Summary Study”). This study, the first of its kind in California, analyzed and aggregated information from both the investor-owned utilities (IOUs) and non-IOU sources into one consolidated document to provide a statewide perspective on energy savings impacts. The study also recommended numerous protocols to make program impact data from disparate sources more suitable for comparison and aggregation.

Funding is quite limited in 2003. A very useful supplemental task that should be undertaken with 2004 evaluation funding is to prepare a set of similar estimates retrospectively for 1994-2000, covering at least the IOU- funded programs and to the extent feasible; other programs in the state. This supplemental report would also document and describe the overall approaches to measurement and evaluation that were used during different regulatory eras to develop these cost and savings estimates

### Study Objectives

This study is intended to build upon the 2001 Summary Study by executing the following objectives:

1. Consolidate reported information on the energy savings, demand reduction, and costs of energy efficiency programs in California for program years 2002 and 2003. Include utility programs, PGC-funded third party programs, and the programs of Sacramento Municipal Utility Districts and the Los Angeles Department of Water and Power.
2. Assess the availability, quality, and consistency of program data from the various implementers and evaluations.

3. Analyze subsets of comparable programs (i.e., targeted at the same sector, addressing the same end-uses and measures, and utilizing similar delivery mechanisms) to understand any variances in fundamental unit energy and demand savings assumptions, program costs, and levels of program evaluation rigor.

### **Proposed Study**

The first task will be to obtain documentation from program administrators and evaluators that provides data on program cost and savings impact as well as key assumptions underlying these data. An expected outcome of this first phase is a qualitative assessment of the availability of reliable program data across various categories.

The second task of the study will be to extract key metrics (such as program cost, annual energy savings, lifetime energy savings, lifecycle cost, levelized cost, and on- and off-peak demand reduction) into a database, and provide summary aggregation and comparison of these reported figures. A companion document to the database should annotate the data assessment process and the quality and consistency of data across the various categories.

The third task of the study will be to analyze selected subsets of similar programs to observe the extent to which fundamental assumptions (such as unit energy savings and operating hours) and levels of evaluation rigor vary from program to program. For these subsets of programs, the reported impacts may be adjusted as a result of the analysis, as warranted.

The fourth task of this study will be to revisit the feasibility of the 2001 Summary Study recommendations and provide additional recommendations that would enhance the availability, quality and consistency of program data.

### **Study Deliverables**

1. Summary Study Report that presents the information produced in Tasks 1- 4
2. Summary Study Database that contains all available data for specified fields of information on each program included in the study.

### **Timeline**

Start date: 8/1/03; End date: 6/30/04

# **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 the CPUC. It focused on the five hard-to-reach (HTR) 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 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 2001 and 2002 with HTR groups and provide a new set of information and data for serving HTR groups.

## **Study Objectives**

This project will provide the most recent available data on the five categories of hard-to-reach residential customers, for use in program design and program targeting and marketing.

## **Study Description**

The new releases of Census 2000 data offer opportunities to utilize and update the HTR market data. For instance, the 2001 RNA study could provide Census 2000-based proportions of Asian and Hispanic ethnic populations at the zip code level but not proportions for non-English speaking households as a HTR group. The new releases from the Census 2000 data can now be used to update these 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 zip code data suggests that program managers need to be provided additional information to help them better target the rural market. The rural zip code list is based on an available list of rural areas as defined by Federal and State grant programs. Some of the questionable cases of zip codes 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.

## **Study Deliverables**

The study will provide actionable support tools that will aid in identifying the HTR market. The tools will include provision of zip code-based listings of target markets and maps for these markets.

# 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. This research will assist the California Public Utilities Commission, other policymakers and program implementers make informed decisions on program planning, design and implementation throughout the state.

## Evaluation Approach

1. Input updates and model enhancements: Review existing market potential studies for the commercial, residential, and 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.
2. 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.
3. 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.
4. 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**

Collect secondary data to conduct the market potential studies, analyze the data to provide market potential results for different sectors, develop emerging technologies forecasts, prepare action plans, and assess 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.

### **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; and 4) updated analyses and reports pertinent to portfolio planning and risk mitigation.

### **Timeline**

Start date: August 1, 2003

End date: December 31, 2004

# **NEW CONSTRUCTION SATURATION AND POTENTIAL 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. Multifamily Low Rise New Construction;
3. Multifamily High Rise New Construction;
4. Commercial New Construction; and
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, multifamily, 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; and 4) final reports

## **Timeline**

Start date: June 1, 2004

End date: March 31, 2005.

# **DATA INTEGRATION SCOPING STUDY 2003 EM&V PLAN**

Sponsor: Southern California Edison

## **Introduction**

Processes for transferring and linking data among several 2002-funded studies are needed. This project will explore and summarize the data and software requirements for making such data transfers and linkages.

First, the energy savings and demand reduction data developed in some of the evaluation, measurement and verification (EM&V) studies of 2002 programs need to be used to update the Database for Energy Efficiency Resources (DEER) and its associated Deemed Savings Database. These estimates should also be used to update the Energy Efficiency Potential databases. Periodically, it may also be desirable to update remaining market potential for some measures in the Potential databases by using EM&V results on the additional market penetration of efficient technologies due to the programs. The Evaluation Framework project may need to take these updating needs into account as it develops guidelines for EM&V studies.

Some of these databases should link to the Groupware database being developed for CPUC Energy Division staff to track and analyze programs. It may also be desirable to link the Best Practices database with some of the other databases. Both the data and potential software requirements of such linkages would need to be defined.

The Groupware-related linkages would be for exclusive use by the Energy Division. Data in the Potential, DEER/Deemed Savings, and Best Practices databases would be publicly available on the web for use by program planners and implementers.

## **Study Objectives**

This study will summarize the data and software requirements for transferring and linking data produced in several of the statewide studies. These transfers and linkages are needed to provide an efficient and current system of databases and analysis tools for selecting, designing, and tracking programs.

## **Study Description**

The project will collect information from study managers and consultants on the precise types of data that their studies will make available. It will explore where these data could increase overall data accuracy and currency by being used to update the data within other statewide database projects. Where such potentials exist, the project should develop recommended data definitions for consistency of the data, plus processes or software designs that would allow the data transfers or linkages to be quickly and accurately made.

## **Study Deliverables**

The study report will identify and define the data fields that need to be developed and used in common by some of the statewide projects. It will also describe the processes and the software that will be needed to facilitate the process of data transfer and linkage.

# STATEWIDE RESIDENTIAL MARKET SHARE TRACKING STUDY 2003 EM&V PLAN

Sponsor: Southern California Edison

## Introduction

2002 funding is sufficient to keep this ongoing study going until early 2004, so no 2003 funds are being requested for it. It is included in the study plans because it requires coordination with the other new studies, and because it will need to be given more funding early in 2004.

The Statewide Residential Market Share Tracking Study (RMST) has completed nearly four years of 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 second 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.

The continuation of this study is important because evaluation of current statewide energy efficiency programs and initiatives requires extensive knowledge of baseline market conditions and of changes relative to that 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 many 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.

## Study Objectives

1. Provide ongoing data on the market share of energy-efficient equipment for eleven residential appliances and lighting, in both the retrofit and new construction markets.
2. Explain the methods of data collection and the limitations of the data provided.

## Study Description

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 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.

## 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 these primary retail sources.

Tracking Lighting at Point of Sale: In the past years, the RMST Study has contracted with various providers of retail lighting data, to receive retail point-of-sales (POS) lamp data semi-annually. These data include national sales data as well as sales within California. The 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.

## 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 homes that were constructed from June 1998 through June of 2000.

### 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 CF6-R forms, on which the state mandates that certain energy efficient measures be recorded.

## **Study Deliverables**

The RMST project produces 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 efficiency programs and natural market changes. The reports produced will be in two formats:

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

# **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 evaluation, measurement and verification (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 that will be the most useful as a resource and tool for users of the data and information; and
- 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 Web site tool capabilities and features;
- Assess information technology (IT) requirements;
- Develop the Web site/database to have the ability to allow drill down to primary source documentation, e.g. procedures, manuals, marketing collateral; and
- Develop costs for maintaining functional links to source documents.

### **Study Description**

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

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.

User Behavior Analyses – This phase shall build on a traditional EM&V studies approach to track user behaviors and energy efficient practices in response to the best practices program database and Web site. 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 practices database delivery. User satisfaction surveys regarding users' perceptions on how the various best practices components and programs have helped them design better energy efficiency programs will be verified.

### **Deliverables**

The 2003 EM&V study will produce a report that not only establishes the 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.

## **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 2002 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; and
- Enhancements on longitudinal study given lessons learned from the California Energy Commission's (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 HEER program's efforts to provide helpful information, services, 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; and
- Provide ongoing feedback and corrective guidance regarding program implementation.

## **Evaluation Approach**

To meet the above-mentioned study objectives, the EM&V evaluation approach shall include:

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, effective useful life (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 obtained 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 and 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 and decision-maker analyses.

3. Follow-up to the 2002 Process Evaluation

In 2003, EM&V will continue to focus on process issues with particular emphasis on program changes implemented in 2003.

## **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. 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 energy efficiency recommendations. Accordingly, it is essential to gather this information. 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 among 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, 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

- 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. The current 2002 impact evaluation work is updating estimates of refrigerator and stand-alone freezer annual energy consumption and estimates of free ridership and part-year use – the two components of the net-to-gross (NTG) factor for refrigerator recycling. This is being done using a metering methodology for unit energy consumption and implementing a rigorous set of NTG questions for program participants and non participants.

### **Study 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, this study will be comprised of the following aspects.**

1. Verification of program goal achievement:

The verification will involve several cross-checking tasks to validate the claimed program achievements in terms of energy savings, number of units recycled across utility territories, and inclusion of hard-to-reach (HTR) categories of customers. The work will include review of the tracking database and a follow-up survey of a sample 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 has been used to 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.<sup>1</sup> 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 well-accepted approach to estimating the actual energy usage of major residential appliances: econometric analysis using metered total household energy use 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.

3. 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

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<sup>1</sup> 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%

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 billing data to arrive at a relationship between modeled UEC and observed household energy usage levels. Pre and post monthly usage for each household is predicted by such variables as weather effects, removal/replacement/addition of appliances in the household, and other non-appliance changes. All of these variables and the modeled UEC estimate of refrigerator usage will be included in the multivariate regression analysis to arrive at realized savings for the participant households. The billing analysis approach will be conducted at two levels:

- An inexpensive approach in which the regression uses only variables available for all program participants. This includes predicted refrigerator UEC for all of the program participants, weather data, billing data, dwelling type, and information from the tracking data that can be used to distinguish primary versus secondary units<sup>2</sup>.
  - A more precise and expensive approach that surveys a sample of 2003 program participants to gather detailed information on changes affecting household consumption (an “informed” 2003 sample), in addition to the information described above.
4. An inexpensive 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 the DOE test results found for old refrigerators of the same models. No new data collection is required. This analysis has not yet been done for the large dataset of lab-tested refrigerators developed for the SCE and California statewide refrigerator recycling programs. The degradation factors will be compared to other studies on this issue<sup>3</sup>. Such a test should not be done with on-site metering data, because the metering methodology is not consistent with the methodology used to develop the label usage.
  5. We propose to collect paired data for a sample of 50 to 100 refrigerators, both in situ and DOE lab metering data, as the first phase of a two-phase approach to reducing the uncertainty about measurement differences between in situ versus DOE lab metering. The primary use of this information will be to reduce the uncertainty surrounding the use of DOE lab metered data to estimate the energy usage of older and second refrigerators. Such data collection will enable us to compare in situ metering directly to contemporaneous lab metering, while identifying and attempting to correct for the sources of non-comparability. The 2003 study would initiate such data collection, add

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<sup>2</sup> A combination of tracking system information on “location of unit” and whether it is replaced with a new unit can be used to determine this.

<sup>3</sup> 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

it to the CPUC/ICF Consulting data, and conduct the analysis with this enhanced sample. This would be done with the expectation that a subsequent EM&V study can further enlarge the sample size to the quite large and expensive level needed to perform a fairly definitive analysis.

#### 6. 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.

#### 7. 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 making recommendations for 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.

# **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

### **Introduction/Program Description**

The Express Efficiency program is a statewide program that provides financial incentives to small and medium sized nonresidential 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 those of 2002 to analyze the restrictive impact of the aggregation rule on customer participation. This rule excluded customers whose aggregated demand across all of their accounts exceeded 500 kW. The rule was redefined 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 follow established methods for evaluating program success and will provide additional information regarding methods for effective energy savings. This evaluation study for 2003 will build on the evaluation results from PY2002 and include customer behaviors, the impact of processes (e.g., aggregation rule), the energy crisis and market penetration based on 2003 participation.

### **Study Objectives**

The goals of the 2003 evaluation are to assess the Express Efficiency program's ability to achieve energy savings and to increase the participation of hard-to-reach (HTR) businesses, the impact of state standards, PG&E and regulatory goals, and discontinued technologies on program participation. The primary measurement of the program's success will be the verification of measure installations and the tabulation of the estimated energy and demand savings, including in HTR businesses. The evaluation will continue to address program delivery, program design, the impact of studies performed in 2002, benchmarking, cost-effectiveness, and the program's 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; and 4) final report or reports

## **Timeline**

Start date: October 1, 2003

End date: December 31, 2004

# **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 nonresidential energy audits program will expand upon the efforts to evaluate the effectiveness of program implementation and to estimate energy savings for the 2003 program. PG&E will use results and lessons learned in 2002 evaluations to inform study designs and work plans for 2003 efforts. PG&E proposes to evaluate new features in the 2003 nonresidential 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 PG&E expects 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 PY 2002 pilot audit callback reminder will be continued.

From an evaluation perspective, PG&E will examine customer satisfaction and preference by customer segment and audit type and assess any difference from 2003. PG&E will also examine the impact of the pilot audit callback reminder in influencing customers to adopt energy efficiency measure (EEM) 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, PG&E wants to continue to examine the ongoing impact audits have over time on customers' behaviors, attitudes and adoption of EEMs. Therefore, PG&E proposes 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 as well as proposes 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; and
- Estimate energy and/or peak load savings accruing from participation in the audit program over time.

### **Study Description**

1. To accomplish the aforementioned objectives, the study will include:
2. 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 hard-to-reach), 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.
3. 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: August 1, 2003

End date: December 31, 2004

# **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 Energy Efficiency Training and Certification for Building Operators (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 PG&E expects 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 PY 2002, with minor modifications to training content.

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

## **Study Objectives**

The 2003 EM&V Study for the Energy Efficiency Training and Certification for Building Operators (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 the program to non-participants; and
- Document all participant post-program energy efficiency adoption actions.

## **Study Description**

The proposed study will evaluate the Statewide 2003 Energy Efficiency Training and Certification for Building Operators (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; and
- 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's 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: January 1, 2004

End date: March 31, 2005

# **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.

# **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.

# 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 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 NRNC 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 2003 program refinements. These refinements include changes in rebate levels and increased design and inspection assistance to multifamily builders. The study descriptions below provide the focus and types of evaluations PG&E expects 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 multifamily (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 percent 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 percent. To encourage increased participation by multifamily builders, the PY 2003 program offers a design assistance incentive and help with inspections.

## **Study Objectives:**

The study has the following objectives:

1. Document energy savings and compare energy savings estimates for the PY 2003 program with the energy savings estimates from the PY 2002 program;
2. Determine if there have been any changes in the building characteristics of program participants between the PY 2002 and PY 2003 programs;
3. Investigate builders' perceptions of the California ENERGY STAR® New Homes Program;

4. Evaluate the effectiveness of program modifications made in PY 2003; and
5. 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 multifamily 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 multifamily 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 percent savings from the codes and additional assistance to multi-family builders.
4. Conduct interviews to collect data from participating single-family and multifamily 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; and 3) Final Reports

### **Timeline:**

Start date: March 1, 2004  
End date: June 30, 2005

# **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.



# 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.

# 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:

1. Identify whether the program goals were met.
2. Summarize all the CASE initiatives.
3. Summarize where each CASE initiative is in the code adoption process.
4. 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.