

# **Integrating Process, Impact and Market Assessments: A Case Study in Maximizing the Value of Evaluation Results**

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## **Abstract**

California has recently experienced a major shift in evaluation management, with different entities managing 2006 program process and impact evaluations. As a result of this change, California program implementers and evaluators face uncertainty about the extent to which market, process and impact assessments will be coordinated in the near future. This paper examines the benefits and drawbacks of evaluation coordination and comprehensiveness. We use as an example the 2004-2005 California Statewide Multifamily Rebate Program evaluation. This comprehensive evaluation helped bring crucial and timely information in a most efficient manner to program managers allowing them to adjust their programs and savings claims and begin to adapt to changing multifamily market and programmatic contexts.

The paper concludes that the current evaluation approach in California allows for more flexibility than prior approaches, since funding levels will be determined at the program or sector level based on evaluation need rather than an a priori prescribed basis, enhancing efficiency of the portfolio of evaluations. However, there is likely to be missed opportunities and inefficiencies at the program evaluation level due to the absence of coordination across evaluations. The paper recommends the establishment of an explicit mechanism for coordination of early and ongoing feedback of evaluation scope, methods and results for both process and impact evaluations. This would allow for coordination of research activities across evaluations, which could increase efficiency of resources and minimize respondent fatigue. Likewise, program managers and evaluators would learn of evaluation results on a timely basis and adapt programs and evaluation approaches accordingly.

## **Introduction**

Depending on the regulatory and programmatic context, the comprehensiveness and coordination of energy efficiency program evaluation may vary to a great extent across the nation. Even within a particular region or state, a shifting policy paradigm may lead to changes in evaluation design that effect coordination and comprehensiveness of evaluation.

For example, recent California program evaluations have been broad and included integrated market, process and impact evaluations. However, going forward (i.e., for 2006-2008 programs) the California Public Utilities Commission (CPUC) is most concerned with reliability of energy savings claims and will be exclusively sponsoring impact evaluations. The California investor-owned utilities (IOUs) – Pacific Gas and Electric Company (PG&E), San Diego Gas and Electric Company (SDG&E), Southern California Edison (SCE), and Southern California Gas Company (SCG) – will independently sponsor process evaluations. These activities may or may not be coordinated. As a result of this change, California program implementers and evaluators face uncertainty about the extent to which market, process and impact assessments will be coordinated in the near future.

This paper examines the benefits and drawbacks of evaluation coordination and comprehensiveness. We use as an example the California Statewide Multifamily Rebate Program. For the 2004-2005 program period, the evaluation of this program was comprehensive and coordinated, and

included process, market and impact assessments. This evaluation offered unique value and insights due to the integration of study components.

To enable readers to better understand the issues involved with our case study, we provide program background and discuss the impacts of the 2000-2001 energy crisis on energy policy in California. Next, we provide an overview of the 2004-2005 Multifamily Program and evaluation, and discuss some of the key results and recommendations. Benefits and drawbacks of evaluation coordination and comprehensiveness are then examined. We end the paper by making recommendations about how to capture some of the benefits from coordination of evaluation studies during the next cycle of California program evaluations.

## Political and Historical Context

The current energy efficiency policy environment in California is largely a reflection of policymakers' reactions to the state's recent energy crisis. Between the summer of 2000 and winter of 2001, the California Independent System Operator declared over two months' worth of system emergencies. Rolling blackouts were implemented on several occasions. In early 2001, California Energy Commission analyses projected that the State could face a shortfall of five thousand megawatts during the summer. Consequently, California policy makers nearly tripled energy efficiency spending over 2000 levels to \$1.1 billion<sup>1</sup>; this funding focused on resource acquisition to address the near-term crisis. Prior to the crisis, California energy efficiency programs had been focused on transforming markets via long-term market-based interventions. [Eto et al 1996] The energy crisis was a catalyst for returning to prior program strategies that offered immediate energy savings, but the market transformation groundwork was maintained. [Calwell and Zugel, 2003]

Prior to the energy crisis, the CPUC was considering models of program implementation that would involve non-utilities in order to engage the private market and encourage innovation and capture the most energy efficiency benefits. For 2002-2003 and 2004-2005 program cycles, utilities and third-party implementers (i.e., private non-utility companies) bid to implement programs, which were reviewed and selected by the CPUC and administered by the IOUs. By 2006, the CPUC returned program responsibility to the IOUs with 20 percent of program funding earmarked for innovative third parties. The IOUs would review and select bids and administer all programs.

With respect to program evaluation, from 2002 to 2005 the CPUC provided oversight and the California IOUs managed Statewide evaluations. These evaluations were prescribed (always including impact, process and market assessments) with predetermined budgets based on the program's share of energy savings. These studies were designed to adhere to specific objectives outlined in the CPUC's Energy Efficiency Policy Manual [CPUC 2003] and were guided by the California Evaluation Framework [TecMarket Works Team 2004] and the California Energy Efficiency Protocols [TecMarket Works Team 2006]<sup>2</sup>.

For 2006-2008 California IOU-administered programs, there has been a major change in the management and implementation of evaluation studies. The CPUC will manage large-scale impact evaluations covering all sectors addressed by the portfolio of energy efficiency programs in order to ensure reliability of energy savings.<sup>3</sup> Each IOU will manage process evaluations of their individual programs. This is a radical departure from coordinated management of integrated process, market and impact studies such that occurred for the 2004-2005 programs. With different entities managing different aspects of the 2006-2008 program evaluations, there is likely to be different contractors and

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<sup>1</sup> CPUC Decision 04-09-060.

<sup>2</sup> CPUC Decision 05-04-051.

<sup>3</sup> CPUC Decision 01-05-055.

schedules and there does not appear to be explicit vehicle for coordination across the state (for IOU-sponsored process evaluations) or across types of evaluations (i.e., impact and process) for a particular sector or program. The CPUC will continue to provide oversight of IOU-managed studies (e.g., approving consultants), but they will not review or provide input to the scope of the evaluations, review evaluation results or coordinate process activities with impact evaluations.

## **The California Statewide Multifamily Rebate Program**

### **Program Overview**

The 2004-2005 California Statewide Multifamily Rebate Program was launched in 2002 to address the needs of the multifamily sector. This market was served prior to 2002 by the California Residential Contractor Program, which typically focused on single-family homes. Thus, the 2002 program was innovative in the state in that its design was tailored to the unique barriers faced by the multifamily sector. In particular, the program offered financial incentives, along with program marketing and education, to help multifamily property owners and managers overcome the split-incentive barrier<sup>4</sup>.

The 2004–2005 program was offered statewide in the service territories of PG&E, SCE, SDG&E and SCG. The program promoted energy savings in apartment dwelling units and in the common areas of apartment and condominium complexes and mobile home parks. Property owners (and property managers, as authorized agents for property owners) of existing residential multifamily complexes with five or more dwelling units qualified for rebates for installing a variety of energy efficiency measures. The majority of the program’s claimed energy savings was met through the installation of compact fluorescent lamps (CFLs), programmable thermostats and boiler controls. [KEMA 2007]

### **Evaluation Approach and Results**

KEMA was hired in early 2005 by the California IOUs and the CPUC to assess the performance of the 2004–2005 California Statewide Multifamily Rebate Program in terms of accomplished program goals and effectiveness of program processes. The evaluation included a process evaluation, market assessment and impact evaluation. Table 1 below shows how the evaluation approach (the second and third columns) addressed each of the CPUC’s evaluation requirements (shown in the first column).

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<sup>4</sup> Although property owners and managers are responsible for facility improvements, they usually do not pay energy bills for the tenant spaces and therefore have little incentive to install more expensive energy-efficient measures in these spaces. The Multifamily Program’s rebates helped reduce—and in some cases totally eliminate—these higher first costs for energy-efficient equipment.

**Table 1**  
**CPUC Energy Efficiency Policy Manual Evaluation Requirements and Study**  
**Components and Approach to Meeting Requirements**

CPUC Policy Manual Evaluation Requirement	Study Component(s)	Overview of Study Approach
1. Measuring level of energy and peak demand savings achieved	Impact evaluation	<ul style="list-style-type: none"> <li>The impact evaluation included both a verification study and a measurement study, which together yielded estimates of the program's energy and peak demand savings.</li> </ul>
2. Measuring cost-effectiveness	Cost-effectiveness assessment	<ul style="list-style-type: none"> <li>KEMA updated the program's cost-effectiveness calculations using the measurement and verification results from the impact evaluation. We recalculated the program's cost-effectiveness using the updated formulas and included the results in the study's draft and final reports.</li> </ul>
3. Providing up-front market assessments and baseline analysis	Market Assessment	<ul style="list-style-type: none"> <li>The market assessment included a review of existing multifamily market baseline studies, the results of which were used to inform our process and market assessment and were incorporated into our market assessment results.</li> </ul>
4. Providing ongoing feedback and guidance	Impact, Process and Market Assessments	<ul style="list-style-type: none"> <li>The evaluation consisted of two phases of research, with interim process, impact and market assessment results provided mid-year 2005.</li> </ul>
5. Measuring indicators of effectiveness, including testing of the assumptions that underlie the program theory and approach	Process and Market Assessment	<ul style="list-style-type: none"> <li>We reviewed program filings and prior evaluation reports to establish a preliminary description of the program theory.</li> <li>Interviews with program staff, installation contractors and property managers/owners were used to test the assumptions underlying the program theory.</li> </ul>
6. Assessing the overall levels of performance and success of programs	Impact, Process and Market Assessments	<ul style="list-style-type: none"> <li>The verification study assessed the overall levels of program performance in terms of the number of program-qualifying measures installed.</li> <li>The measurement study estimated energy and demand savings associated with installed measures.</li> <li>The process and market assessments determined the effectiveness of the program in meeting its goals.</li> </ul>
7. Informing decisions regarding compensation and final payments	Impact evaluation	<ul style="list-style-type: none"> <li>A verification study was performed, which generated verification ratios for each measure installed under the program. These ratios were applied to the program's claimed accomplishments to provide counts of program-level verified measure installations.</li> </ul>
8. Helping to assess whether there is a continuing need for the program	Process, Cost-effectiveness and Market Assessments	<p>The final evaluation report includes a statement concerning the continuing need for program. This statement was based on consideration of the following pieces of evidence:</p> <ul style="list-style-type: none"> <li>The degree to which the program addressed the barriers to implementation identified by program participants;</li> <li>To what degree the program mitigated these barriers in any sustainable way; and</li> <li>Quantitative assessments of the relative cost-effectiveness of the program.</li> </ul>

**Process and Market Assessments.** The process and market assessments included over 300 telephone surveys with participating and non-participating property managers and installation contractors and two waves of in-depth interviews with program staff. We also reviewed and incorporated market characterization data from a prior study of the California multifamily market as well as two concurrent evaluations of local programs targeting affordable multifamily housing [ADM and TecMRKT Works 2000; KEMA 2006:1 and KEMA 2006:2]. In general, the process evaluation found that the program managers had designed the program to address the most important barriers facing the multifamily segment: first cost, hassle factor or transition costs and split incentives.

The program attracted a dedicated pool of mostly unskilled contractors that install a high volume of measures at little to no cost to property owners and managers. The evaluation found that most of these installations would not have occurred in absence of the program. The program has been cost-effective under this model, but has been dominated by lower cost retrofit measures. As the target market becomes saturated with CFLs and programmable thermostats, the program will need to ramp up its marketing efforts to engage properties and skilled contractors to sell more expensive measures that require out of pocket expenditures by properties. In the future the program will likely need to adjust its program savings goals and cost-effectiveness projections downward to reflect the changing market context.

**Impact Evaluation.** The impact evaluation relied on more than 200 on-site surveys with participating properties to estimate installation rates of program-qualifying equipment and collect input data for estimating savings parameters. Lighting gross savings were determined by collecting room locations for CFL installations and applying hours of use assumptions from the 2005 California CFL Metering Study [KEMA 2005] combined with self-reported pre-installation wattage and observed CFL wattage. Programmable thermostat gross savings were determined based on observation of thermostat setpoints combined with self-reported prior thermostat type and usage. Boiler control gross savings were estimated using a billing analysis.

The impact evaluation found that nearly all of the measures claimed by the program were installed, operating and program-qualifying. *Ex post* CFL gross savings estimates were found to be less than *ex ante* savings. CFL operating hours assumptions that were used by the IOUs to estimate *ex ante* savings were based on ten year old studies when CFLs were used more often than they are used today<sup>5</sup>. Programmable thermostat savings were found to be very insignificant with most tenants overriding their programmable settings or not using the programmable features at all. (The program had already removed this measure from their 2006 program in light of similar evaluation findings from a study of 2003 single-family programmable thermostat users). [Dyson et al, 2005]

Boiler control savings were found to be substantially overstated, with *ex ante* savings assumptions based on the highest possible savings potential, which is not typically realized by the current program design for a variety of reasons. Some controls were installed where controls already existed, some vendors continuously monitor the controls while others do not, and the size and characteristics of multifamily properties and central boilers all contributed to widely varying savings. As a result of these findings, the IOUs are sponsoring follow-up research on multifamily boiler controls. These recently launched studies will identify the savings potential from this measure, the site and equipment characteristics that will lead to the highest savings, and effective program strategies to screen for high savings potential sites.

## **Value of Coordinated Impact, Process and Market Assessment**

The results from the process, market and impact evaluations combined provided program implementers and policymakers with a complete and timely understanding of the program's performance and the context in which that performance was achieved. A few examples of insights gained from this coordinated and comprehensive effort include:

- From a process and market perspective, programmable thermostats are an ideal measure for the multifamily sector because there exists a high volume of retrofit opportunities and low-skilled installation contractors can install them quickly and cheaply. Combined with their assumed energy savings potential, program managers thought they had found a measure as promising (if

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<sup>5</sup> At the time the program was proposed, no more recent data were available until the CFL Metering Study was published in 2005.

not more promising due to the gas savings) as CFLs. However, the impact evaluation confirmed that these measures offer little to no real energy savings among the target market.

- From an impact perspective, it appears that boiler control measures do not offer any cost-effective energy savings potential. However, interviews with installation contractors and program staff revealed that it is program and market context that is driving this result – that cost-effective energy savings potential from this measure likely does exist, but only with implementation improvements.

Going forward the program must add a screening process to identify sites with high potential energy savings. Likewise, the program must investigate the types of controls and monitoring systems that will offer the highest potential savings under a multitude of possible equipment and site contexts.

One of the key findings was that the impact evaluation was at a loss to explain why the apparent savings were so low, until the process evaluation found almost in passing that some vendors were installing up to 30 percent of the controls on boilers where operable controls already existed. Without the process evaluation findings, the credibility of the impact evaluation would have been subject to incredulity.

- Impact evaluation results indicated that the program's main gas measures did not yield nearly the savings expected, causing major concerns about realizing gas savings goals. The process and market study results offer insights on where to focus program efforts to realize future gas savings as well as a reality check on the effect going after those savings will have on the program's total savings potential and cost-effectiveness.
- Even with lower operating hours than expected, CFLs will continue to be a cost-effective measure for this program. However, the process and market assessment indicated that the market is becoming saturated and in fact CFLs are becoming standard practice such that net savings from CFLs will likely decline in years to come. The program will need to rely more on CF fixtures and other non-lighting measures to meet future electric savings goals.

Together, the process, market and impact components of the evaluation provided an indication of the program's current progress and the major challenges it faces in the near and long term as the program and market contexts change substantially. With the removal of programmable thermostats, a major reduction in the potential for cost-effective boiler control installations and limits on CFL installations, the mix of contractors that will be attracted to the program will change completely as well as the volume of properties that may be reached and number of measures installed. The comprehensive and coordinated 2004-2005 program evaluation helped bring crucial and timely information in a most efficient manner to program managers allowing them to adjust their programs and savings claims and begin to adapt to changing multifamily market and programmatic contexts.

## Conclusions

The evaluation approach used in California during 2002 to 2005 was prescribed such that each program was evaluated comprehensively in a coordinated fashion. These evaluations offered timely and efficient results to program managers. However, at the portfolio level the allocation of evaluation dollars may not have been the most efficient, with a lack of flexibility in determining program evaluation budgets and components. While for many programs comprehensive evaluation makes sense every two years, other programs may require small process or market assessment in a given year and only verification of program installations, while another program may require expensive measurement of program impacts.

The current approach in California allows for more flexibility, since the IOUs and the CPUC will determine evaluation funding levels at the program or sector level based on evaluation need, enhancing efficiency of the portfolio of evaluations. However, there are likely to be missed opportunities and inefficiencies at the program evaluation level due to the absence of coordination across individual evaluations.

The IOUs as well as third party program implementers have strong incentives, however, to integrate impact and process evaluation results for their individual programs as soon as they are available in order to adapt their current and future programs to maximize cost-effectiveness and make use of the most up-to-date and robust energy savings estimates. The IOUs will also be concerned with minimizing redundancy of surveys with their customers and the trade allies that serve them. But it is unlikely that there will be a formal process for transmitting evaluation research plans and results to them.

## Recommendations

One obvious practical way to mitigate some of the potential problems discussed above is to conduct the evaluations at the same time. Certainly that is the plan. But while some IOUs have a tight timeline for launching all their 2006-2008 process evaluations, others will stagger their evaluations over a much longer time period. Likewise the CPUC plans to review evaluation proposals early this summer such that impact evaluations may begin in the early fall. But this schedule is tentative and given the sheer volume of programs and the complexity of the contracting process and constrained CPUC staff, this schedule is unlikely to be adhered to.

Another potential solution is to establish an explicit mechanism for coordination of early and ongoing feedback of evaluation scope, methods and results for both process and impact evaluations. This would allow for coordination of research activities across evaluations, which could increase efficiency of resources and minimize respondent fatigue (especially of trade allies and large commercial and industrial customers, which are small, finite populations.) Likewise, program managers and evaluators would learn of evaluation results on a timely basis and adapt programs and evaluation approaches accordingly.

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