National Energy Efficiency Program Best Practices Study:[1]
Overview, Sample Results and Initial Lessons Learned

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ABSTRACT

The goal of the National Best Practices Study is to develop a comprehensive and comparative understanding of energy efficiency program efforts throughout the United States. The Study seeks to broaden the skills and capabilities of energy efficiency practitioners by developing a database of energy efficiency (EE) best practices that can be used as a resource to enhance the design, implementation, and management of energy efficiency programs in California. Unique aspects of this benchmarking effort are its comprehensiveness, use of formal program decomposition and benchmarking, and focus on development of a database and user-driven web site. In particular, program practitioners supported through Energy Efficiency Public Purpose Program (EEPPP) funds will be able to reference the database and apply the information towards the development of more successful energy efficiency programs. This study is the first step to developing a systematic process that identifies and communicates best practices on an on-going or periodic basis. The focus of this paper is to describe the approach and method of this best practices research, present preliminary findings for one program area, and summarize initial lessons learned in conducting the study.

Introduction

The National Best Practices Study (the Study) seeks to broaden the skills and capabilities of energy efficiency practitioners by developing a database of EE best practices that can be used as a resource to enhance the design, implementation, and management of energy efficiency programs in California. In particular, program practitioners supported through public goods funds will be able to reference the database and apply the information towards the development of more successful energy efficiency programs. The focus of this paper is to describe the approach and method of this best practices research, present preliminary findings, and initial lessons learned in conducting the Study.

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Overview of National Best Practices Study

Study Goal

The overall goal of the Study is to develop and implement a method to identify and communicate excellent programmatic practices nationwide in order to enhance the design of energy efficiency programs in California. In particular, program implementers supported through public goods funds will be encouraged to use this Study's products, along with other resource and their own knowledge and experience, to develop and refine energy efficiency programs.

This study is intended as a first-order effort to identify successful program approaches through systematic cross-program data collection and comparative analyses. The study does not expect to produce a census of best practices across all types of programs. Such an approach would be neither practical nor useful given the number of programs that exist; the many differences in policies, goals, and market conditions around the country; the unique needs and market conditions in California; and the importance of encouraging innovation, which by its nature sometimes requires attempting approaches that are not yet proven. If the framework and results of the study prove useful, future phases of the work can expand the number and types of programs covered.

Methodology

Key aspects of the study include a user needs assessment, secondary research, development of the benchmarking methods, identification and selection of programs to benchmark, development of the program database, data collection and program benchmarking, analysis, and preparation of the study's best practices report and final database. In addition, outcome metrics will be tracked. An overview of the studies key activities is shown in Figure 1.

As shown in Figure 2, the outcome of a program – as measured by $ per kWh saved, market penetration or sustainability – can be thought to be a function of (a) changeable program elements, (b) changeable portfolio-level design and programmatic policy decisions, and (c) unchangeable social, economic, demographic, climate and other factors. All of these factors can influence the ultimate success of an energy efficiency program. Some program elements (such as marketing, tracking or customer service) are directly controllable at the program level and can be modified to affect the success of the program. Other elements (such as the program policy objectives and whether the program has a single- or multi-year funding commitment) may not be changeable at the program level but may be changeable at a policy level. Other elements are not changeable and cannot be affected by program managers, implementers, or policy-makers (such as the physical climate or density of the customer base).

Collection

Program information was gathered using primary and secondary sources. Primary data collection occurred primarily through surveys of program managers[2] and review of regulatory filings, annual reports, and program evaluations. A detailed survey instrument guided interviews

[2] Some interviews were also conducted with evaluators and program directors.

Figure 1. Overview of Study

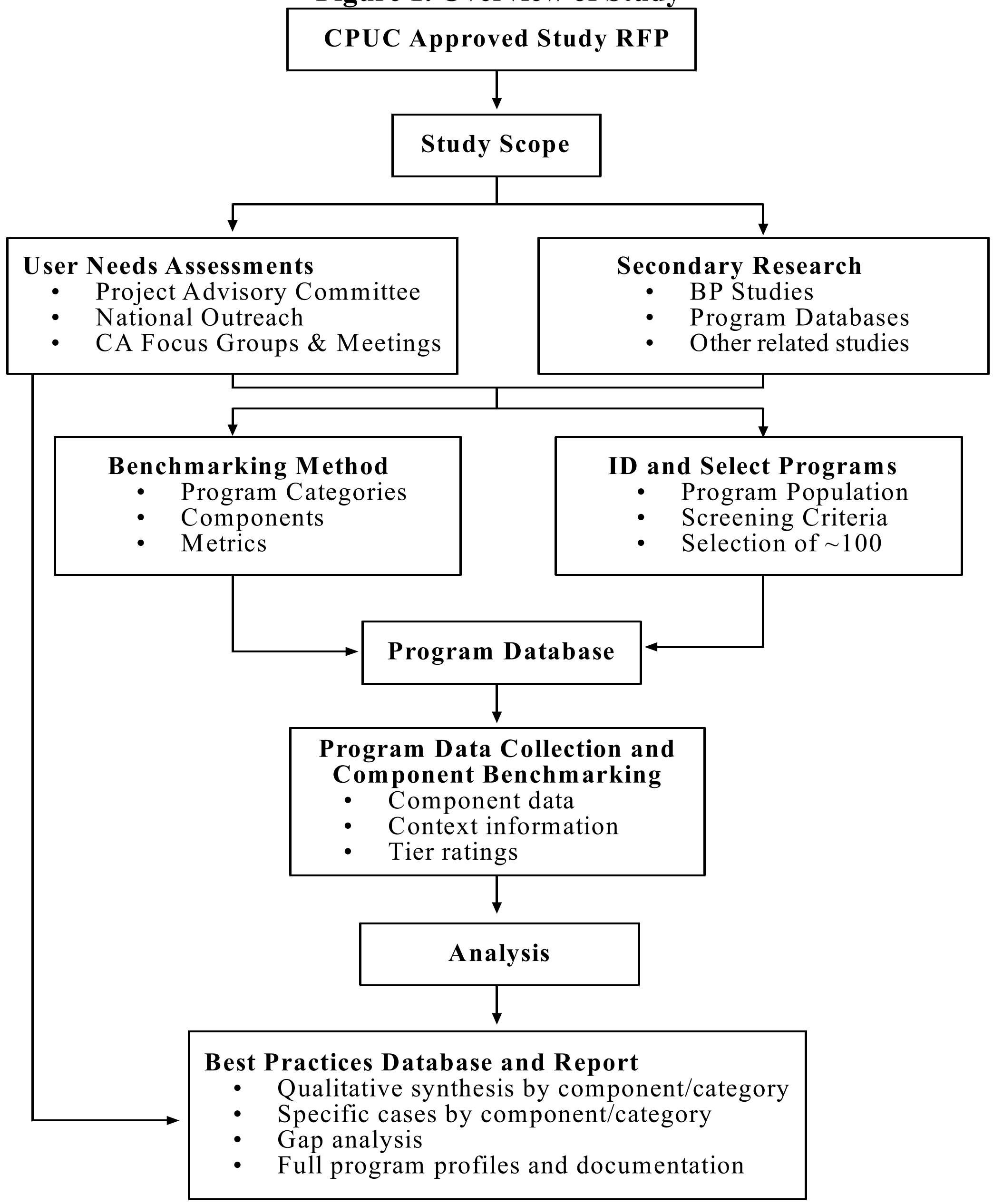
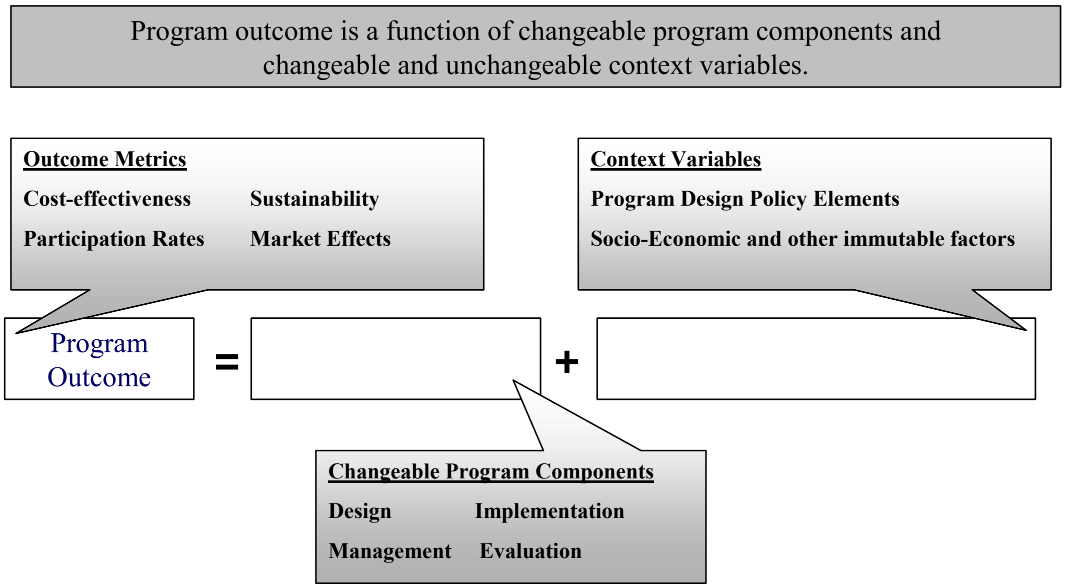


Figure 2. Relationship Among Program Outcomes, Components, and Context



with program staff. The team conducted interviews with program managers that often lasted over two hours, indicating both the comprehensiveness of the instrument and the willingness of program managers to discuss their programs. The survey instrument collected information on three main areas: policy context and environment, outcome metrics, and information about program components. The first set of questions elicited responses on how the program might have been affected by the broader context in which it operates. Next, respondents provided information on outcome metrics, such as program impacts and costs. The remainder of the instrument was devoted to collecting detailed program information for each program component. For each component, respondents were asked to provide factual information (i.e., how the program addressed each issue) and qualitative judgments about what practices they felt contributed to the success of this program and what practices should have been avoided or could be improved.

Components

Our approach focuses on analyzing programs primarily from the perspective of their changeable program characteristics. We developed a method for decomposing programs into components and sub-components in order to systematically identify and compare specific program features of importance to overall program success. The four primary program components are (1) program design, (2) program management, (3) program implementation and (4) program evaluation. These components and their associated sub-components are briefly summarized below:

1. **Program Design.** Program design provides the initial foundation for a successful program. The program design category is decomposed into two subcomponents: **program theory** and **program structure** (which includes policies and procedures). Good program design begins with good program theory and a complete understanding of the marketplace. Good program structure, policies and procedures are necessary to

translate program design theories and goals into practical and effective management and implementation actions.

2. **Program Management.** Program management is the command and control center that drives the implementation process. We decomposed program management into **project management**, **reporting and tracking**, and **quality control and verification**. Project management includes the structure and relationship among responsible parties. Reporting and tracking focuses on approaches to identifying and tracking useful and appropriate metrics that can efficiently be translated into reporting effective information. Quality control and verification includes accountability and improvement processes that are typically carried out through implementation and evaluation activities.
3. **Program Implementation.** Implementation is defined by the actual activities carried out in the marketplace to increase adoption of energy efficiency products and practices. We decomposed implementation into **outreach, marketing, and advertising**, the **participation process**, and **installation and incentive** mechanisms. Good outreach, marketing and advertising efforts should result in relatively high program awareness, knowledge, and participation levels. The participation process is obviously a critically important element of a program's ultimate success. Standard measures of market penetration and customer satisfaction provide one indication of a program's effectives at enrolling and processing customers. Installation and incentives should demonstrate evidence of installation and delivery follow-through on marketing and outreach efforts.
4. **Evaluation and Adaptability.** In addition to the design, management and implementation components, we assert that programs should also be analyzed for the effort that has been put into evaluating their effectiveness and their ability to adapt to evaluation findings and changing market conditions. We assess the adequacy of evaluation efforts and how programs use evaluation results or other feedback mechanisms to improve over time.

Categories

Our analysis stratifies and groups “like” programs into multiple categories that address the distinctions between residential and non-residential programs, between existing and new construction, between incentive and information and training, and among targeted end-uses and customer types. Table 1 illustrates the basis for grouping “like” programs to compare across components and sub-components. These program categories were used in the process of selecting which programs to benchmark to ensure that a broadly representative group of programs were included. As of March 2004, eighty-four programs were benchmarked across seventeen program categories.

Products

Project results are being developed in a project report and web site/database that will allow users to access information at varying levels of depth, from top-line summaries and bulleted cut-sheets of best practices, to detailed white-paper style discussions. Study products include:

Table 1. Number of Programs Benchmarked through March 2004 by Category

Program Category			Code	Count
Residential	Incentives	Lighting	R1	6
		Heating & Cooling	R2	6
		Appliance and Plug Load	R3	3
		Single-Family Comprehensive	R4	5
		Multi-Family Comprehensive	R5	6
	Information & Training	Whole House Audit with no/minimal incentive	R6	2
		General & Other Comprehensive	R7	6
	New Construction Information & Incentives		R8	7
Non-Residential	Incentives	Lighting	NR1	4
		HVAC	NR2	6
		Refrigeration, Motors, Compressed Air, Process	NR3	3
		Small Comprehensive	NR4	2
		Large Comprehensive	NR5	8
	Information & Training	End-Users	NR6	4
		Trade Allies	NR7	6
	New Construction Information & Incentives		NR8	7
Other	Cross Cutting		O1	3
		TOTAL		84

*Count reflects completed **in-depth interviews**.

- **Web Site/Database.** An online database with report writing features will offer direct links to program-specific collateral and reports. Information will be accessed at varying levels of depth through a variety of paths (by and across program category, program component, etc).
- **Summary of Program Characteristics and Outcomes.** This study product will include analyses of best practice findings that cut across program categories, a descriptive overview of program statistics and characteristics, and a cross-program analysis of quantitative cost-effectiveness related data.
- **Program Category-Specific White Papers.** For each program category, an in-depth white-paper style chapter presents detailed comparative analyses of benchmarked programs and identification of best practices, associated rationales, key program category-specific issues, and lessons learned. Each program category chapter also includes a gap analysis that compares major California IOU program efforts to similar programs to identify potential activity or performance gaps.
- **Summary Profiles.** For each program benchmarked, we have developed a standardized profiling format that includes information on each program's basic approach to each of the program components assessed and identifies whether quantitative performance data is available. The profile also includes a list of sources and the program contact.

Example of Program Comparison

At the time of this writing, the program category best practice analyses were in progress for several program areas. Each of these program area white papers is 30 to 40 pages in length. An outline of the contents of each of these program category best practice white papers is shown in Table 2. Presenting all of the comparative analysis and best practice results for even one program area is beyond the scope of this paper. To fit within the constraints of this paper and introduce readers to the types of results that will be disseminated through the best practices study, we present an example of results that is drawn from the intersection of one program area and one program component. The specific sample results are for the Program Implementation - Participation Process component of the Residential Lighting program area.

Table 2. Outline of Program Category-Specific Best Practice White Papers

- Summary of Findings
- Introduction
- Overview of Programs and Data (1-2 pages)
- Context
  - Policy Environment
  - Program Strategies and Goals
- Comparison of Program Features and Identification of Best Practices
  - Program Theory and Design
  - Program Management
  - Project management
  - Reporting and tracking
  - Quality control and verification
  - Participation process (including Installation and Delivery)
  - Marketing & Outreach
  - Program Evaluation
- Comparison of Outcomes
  - Participation Levels and Savings
  - Benefit-Cost Data
  - Market Effects
- Conclusions and Recommendations
  - Best Practices Summary
  - *CA Gap Analysis*
  - Key Category Issues
- Appendixes: Summary Profiles, program materials, secondary sources

Residential Lighting: Program Implementation - Participation Process

In this example, we highlight lessons learned from participation tactics employed by six programs[3] from around the country in the Residential Lighting program area.

All of the programs the research team reviewed relied on ENERGY STAR® labeled lighting products, leveraging marketing dollars by tying program efforts to the growing awareness of ENERGY STAR labeled products. Additionally, all of the programs were affiliated

[3] The six residential lighting programs included are: the California Cross-Cutting Statewide Residential Lighting Program, implemented by the three largest investor-owned utilities in California (Pacific Gas & Electric, Southern California Edison, and San Diego Gas & Electric); the Efficiency Vermont Efficiency Products Program, implemented by Efficiency Vermont (EVT); the Massachusetts Electric Residential Lighting Program; the Midwest Change a Light, Change the World Campaign, implemented by the Midwest Energy Efficiency Alliance (MEEA); the ENERGY STAR Residential Lighting Program, implemented by the Northwest Energy Efficiency Alliance; and United Illuminating's Retail Lighting Program.

with regional or statewide efforts to coordinate the promotion of ENERGY STAR lighting products across traditional program boundaries (utility service territories and/or state lines).

The most striking difference between the residential lighting programs the research team reviewed involved the actual participation process. While every program focused on installing more energy efficient lighting in the homes of residential customers, the tactics used to achieve that goal varied by program. Table 3 displays the different tactics used by each of the six programs.

One significant difference across the tactics involves which market actors are actually targeted by program activities – retailer, manufacturer or end user.

The Northwest Alliance focused almost exclusively on retailers during the program period studied – providing them point of purchase (POP) materials and field support to enable them to sell more ENERGY STAR lighting products directly. Retailers who participate in cooperative marketing efforts must report their sales numbers; the requirement is voluntary for those who do not use cooperative marketing dollars.

MEEA had multiple levels of participation including a sponsoring manufacturer, participating retailers and cooperative marketing efforts. End users participated by completing a coupon at a point-of-purchase (POP) display.

Table 3. Residential Lighting – Program Tactics

Tactic	CA	Efficiency Vermont	MASS Electric	MEEA	NW Alliance	UI
Instant Rebates		✓	✓	✓	(through utilities)	✓
Mail Order Catalog		✓	✓			✓
Special Events		✓			✓	
Cooperative Marketing		✓ (limited)		✓	✓	
Regional Coordination	✓	✓	✓	✓	✓	✓
Retailer Support*	(limited)	✓	✓	✓	✓	✓
Manufacturer Buy-downs	✓		✓ (pilot)			

*Including field representatives, or “Circuit Riders”

United Illuminating and Mass Electric each had a mix of instant rebates and retailer support combined with various other activities including mail-order catalogs and cooperative marketing. In 2002, Mass Electric added an industry-oriented Invitation to Participate (ITP) process that focused on upstream buy-down activities proposed by industry. These industry-sponsored initiatives are increasingly popular in the Northeast.

Mass Electric, United Illuminating and Efficiency Vermont are involved in the Appliance and Lighting Working Group (ALWG) through the Northeast Energy Efficiency Partnership (NEEP). Mass Electric and United Illuminating are instituting upstream incentives, as they are able to, given regulatory and programmatic limits. NEEP staff confirms that in 2003 there were 126 joint promotions through the ITP process among sponsor utilities, mainly representing buy downs through manufacturers and retailers. When asked about the logic behind this effort, NEEP staff explained that sponsoring utilities in the Northeast realized that the energy efficient lighting market existed in large part due to the efforts of energy efficiency programs, and at some point it was important to ask industry to step up to the table and propose ways to increase the market for their products. NEEP staff also noted that many of these efforts were spearheaded in the Pacific Northwest years ago, but were difficult to implement regionally in the Northeast due to differing regulatory requirements. Not all of the sponsoring utilities are able to implement the ITP process due to implicit or explicit regulatory concerns about the lack of detailed installation tracking inherent in upstream efforts.

California's program focused almost exclusively on manufacturers in an effort to buy down the wholesale cost and ultimately reduce the cost to customers. The 2002 program secured manufacturer and retailer enrollment through a participation agreement. Retailers who participate directly have terms of agreement they must follow; those who participate through a manufacturer have little responsibility other than passing on lower costs. For end users, the process is simple - the buy-down is passed on to the retail lighting customers through lower prices for CFLs and efficient fixtures. Previous program years focused on retailer training and marketing support, but program staff stated that this was thought to be a poor investment due to chronic turnover of retailers staff and low levels of hands-on assistance in residential lighting purchases.

Some issues have emerged when programs rely on industry-sponsored promotions. In California, program staff report having to "over allocate" rebate dollars due to manufacturers proposing promotions and projects with retailers that didn't come to fruition. Manufacturers trying to establish a foothold in a given market or with a particular retailer may propose a product promotion in a specific store or service territory. The funds will be allocated accordingly. If the product is not delivered, either because of a falling out or misunderstanding, the proposal will be withdrawn – leaving the program to scramble to find another retailer or manufacturer. Regardless of these issues, program staff report that the design worked.

Efficiency Vermont had the most diverse group of strategies, utilizing everything but manufacturer buy-down in an effort to increase the sale and installation of ENERGY STAR lighting products. In interviews, Efficiency Vermont staff reported looking increasingly upstream, implying that in the future some manufacturer incentives (most likely the ITP model) may be added. For lighting customers, POP rebates are available for up to six compact florescent bulbs and four CFL fixtures per account per year. Customers may also purchase efficient lighting at discounted prices through catalog sales. The program sponsors a number of special events to promote and sell efficient lighting, including torchiere turn-ins. Retailers participate through a Memorandum of Understanding (MOU) giving them point of purchase displays, assistance in ordering and stocking qualifying products and through sales staff training. In return, retailers must agree to promote consumer education, undergo staff training and follow proper coupon redemption procedures.

For energy efficiency programs the ease of participation must be balanced by tracking and accountability and the programs the research team reviewed were no exception. For MEEA, Massachusetts Electric, Efficiency Vermont and United Illuminating, participation required retail agreements and complete information on coupons. These programs are able to track unique customers and total purchases by household and service territory. These activities offer great information in terms of tracking and accountability, but can present other problems. For example, in program evaluation documents, evaluators noted that requiring retailers to verify program eligibility created perceptions of hardship and liability on the part of the retailers who absorbed the risk of ineligible customers, inaccurate coupon completion or other coupon issues.

Offering retail training and support was a common activity, but one whose overall value was questioned by program staff in California because of the high cost of retail support, training, and outreach when there tends to be high staff turnover in retail businesses. To continue market inroads and offset these costs, California employed a different tactic in 2002 by focusing almost exclusively on manufacturers through an upstream buy down effort that sought to lower the price point for CFLs across the state. Manufacturer buy-downs offer a way to leverage program funds by dropping the price of products across the board – presumably increasing product purchases without significant spending on marketing and training where costs are difficult to control.

It is clear that there are multiple strategies available to encourage participation in residential lighting programs. Regulatory and political pressure, the maturity of the market, the experience of the staff and the limits of available dollars all have profound impacts on the mix of tactics ultimately chosen. However, a multi-pronged approach avoids having all ones programmatic eggs in one basket, allowing the program to maintain connections and get feedback from multiple points in the lighting market. An inclusive approach allows everyone to participate to some extent in the program – something capable of maintaining momentum and relationships.

The lessons learned from these various approaches, clearly demonstrate that no single approach has proved to be the single most effective approach. Table 4 displays insights and lessons learned during discussions with program staff. However, the most successful participation strategies appear to be those that target multiple actors – retailers, manufacturers, and end users. Multi-pronged, inclusive strategies allow many multiple actors to participate in a variety of ways. They also provide a hedge against unanticipated market changes in a single point of the supply chain. The exact mix of activities varies depending on the unique circumstances of an individual program's environment. Early market efforts seem to benefit most from trying to increase supply while later efforts appear to benefit most by maintaining market demand.

Lessons Learned From the Study Process

In the previous section, we presented one example of the types of program comparisons conducted in this study. The example represents a very small portion of the many program category-program component results that are being developed. In this section, we summarize some of the initial lessons learned from the study process itself. The objectives and approaches for the study, though ambitious, were built upon lessons learned from related efforts (Eto, et al., 1995; Flanigan, T.; Peters, 2003; York, 2003). Nonetheless, while conducting the current study, several new lessons have been learned.

Table 4. Lessons Learned in Participation Strategies for Residential Lighting Programs

Participation Tactic	Lessons Learned
Retailer Agreements	Make them short and clear, ideally not more than one page. Assure logo will be used correctly.
Retailer Outreach/Support	It takes time to develop the personal contacts and relationships required. Can be expensive, but may be critical to assure appropriate use of POP materials and consistency.
Coupon Redemption	Barcodes greatly simplify redemption for retailers. Watch fulfillment costs and price point. As the price for CFLs decreases, the proportional cost of coupon redemption may become burdensome. Avoid devaluing the product by giving it away.
Retailer Reimbursement	Due diligence requirements from regulators can put undo burden on retailers regarding risk of ineligible customers. Establish a quick turn around time.
Marketing	Avoid "over marketing" when you have limited supply. Marketing can be very expensive, leverage dollars whenever possible.
Invitation to Participate (ITP) or Industry-Sponsored Initiatives	Can reduce the risk and administrative burden associated with coupon redemption. Engages manufacturers to create a market for their own products. Market transformation strategy – may require some agreement from regulators regarding the acceptable level of uncertainty.
Upstream Buy-downs	Can exacerbate due diligence issues with regulators – reporting requirements will dictate how simple a buy-down strategy can be. Investment can reduce the price point and have a profound impact in the marketplace. A high leverage strategy in budget scarcity situations.

Shortage of Quantitative Data for Comparison

Considerable effort was required to obtain outcome metrics, where available. The amount of quantitative data collected by the research team varied widely by program. Many programs do not track basic performance indicators that have consistent meaning across markets, such as cost per kWh saved and market penetration, due to the difficulty of collecting this information. Furthermore, the usefulness of cost-effectiveness indicators is limited by differences in how costs and impacts are accounted for across programs. This dearth of comparable quantitative data, while not unexpected, points to an issue that demands attention from the industry.

Reliance on Qualitative Judgments

The dearth of reliable empirical data compelled the team to adopt a more qualitative, judgment-based approach to identifying best practices, with attendant problems in justifying qualitative assessments. A scoring approach was envisioned for differentiating program performance that would rely on quantitative cross-cutting metrics, but this nomographic approach had to be set aside in the absence of sufficient quantitative information. Furthermore, such an approach is not feasible when the number of independent variables is greater than the number of observations, as is the case with energy efficiency programs.

Challenges in Program Selection

The research team employed a purposefully academic method of program selection to ensure sufficient representation of programs that are already perceived as "good," while allowing for a random selection of other programs against which to benchmark. The program screening and selection process utilized a combination of team-nomination, canvassing, secondary sources, and random stratified selection. This method worked well in selecting about half the programs for inclusion in the study, the final program count is currently short of the initial target of 100 programs for several reasons.

- First, the random selection method yielded many "soft" programs unsuitable for study (i.e., programs that did not track participation or budgets, did not have measurable impacts, or did not really represent meaningful, discrete programmatic efforts).
- Second, it became clear that the diminishing returns of scouring niches for little-known programs did not justify the cost of additional time and effort.
- Third, the study sought to compare and contrast unique programs. The database listed fewer unique programs than expected, as several programs that appeared to be unique initially proved to be virtually identical to other programs already in the study.
- Finally, it remains difficult to estimate how many good, unique programs exist in the universe of energy efficiency programs. The initial 100 programs targeted may be closer to the actual population than anticipated, resulting in a sample that pushes the bounds of the population.

Limits of Data Collection

Our comprehensive approach to data collection proved an arduous and ambitious task. First, the survey instrument solicited both factual information and strategic judgments from program staff, and the team learned that a tradeoff exists between gathering factual information and strategic judgment. Program managers, on the front lines of program administration, are well-versed in the workings of the program, but they often lack a broader strategic perspective that lies with strategic sector or portfolio management. Many day-to-day program managers offered only limited lessons learned and best practices. However, the primary program manager was an appropriate choice for our initial and single point of contact, given resource constraints and the need to collect detailed comparative information. Second, despite organizations' willingness to participate, the expected amount of information to collect was simply significant. We reduced the survey instrument substantially as a result of three-plus hour pretest interviews. Even so, the team conducted interviews with program managers that lasted over two hours. While valuable program insights were gathered in interviews, team members were often forced to perform "triage," asking only the most essential questions such as "what are do you think are the best practices in this area and why?"

Lack of Program Evaluations

The industry did not deliver any positive surprises in the area of program evaluation. A number of program administrators appear to be under-evaluating their programs. The lack of regular, consistent evaluations compromised the team's ability to compare empirical, ex post data across programs. This shortcoming may reflect an over-correction by jurisdictions concerned over the cost, scope, and value of large impact evaluations common in the mid-1990s or simply the perception that implementation funds are now too constrained to permit regular and comprehensive evaluations.

Next Steps

The Best Practices team will have completed all of the program category white papers and cross-program category findings by the time of publication of these proceedings. The project team will be working throughout 2004 to develop a Best Practices Website to use as a platform to disseminate project results to a wide audience of potential users. Results will be available in a highly modularized format that will allow a variety of levels of depth and combinations across program categories and components. Summary program profiles will also be available on line for all 100 of the programs benchmarked. We will also explore the feasibility of using the website to allow users to drill down into program profiles to obtain program-specific collateral and other materials such as procedures manuals, rebate forms, and publicly available program reports. Finally, additional programs and program categories may be added and updates will be made to keep the initial program characterizations current.

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